Final Early Removal Action, Construction Oversight Report

Northwest Natural (GASCO) Facility Site

Portland, Oregon

Parametrix

Prepared For:

U.S. Environmental Protection Agency Region 10

November 16, 2006

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GASCO Early Removal Action Construction Oversight Report

Prepared for

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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

On behalf of the U.S. Environmental Protection Agency (EPA), Region 10, Parametrix has prepared this Construction Oversight Report for the non-time critical early removal action conducted at the Northwest Natural (NW Natural) facility (referred to as the "GASCO site") in northwest Portland, Oregon.

This Construction Oversight Report has been prepared to document the activities conducted during the early removal action and includes a summary of oversight methods, field observations, and photographic documentation. In addition, this report includes an evaluation of selected data and other site information to provide an understanding of the issues identified by the EPA project team, which can be used to guide future early removal actions at the GASCO site or other sites within the Portland Harbor Superfund Site.

Based on observations made during oversight of the removal action and a review of site data, project documents, and other information, Parametrix provides the following conclusions and recommendations:

1. Approximately 15,300 cubic yards of tar and tar-contaminated sediment was removed during the early removal action and disposed at a Subtitle C landfill. A pilot cap was placed over the dredged area to limit future releases of contaminants and to evaluate the applicability of sediment capping technology in future removal/remedial actions at the GASCO site. The early removal action appears to have provided substantial benefit to human health and the environment by removing pure tar material and the highest concentrations of total polynuclear aromatic hydrocarbons (tPAHs) at the site. The long-term benefits, which include limiting the potential for direct exposure to contaminated material by aquatic organisms, reducing continual releases of dissolved contaminants from the tar body to the overlying water column, and limiting the potential for scour and deposition of contaminated sediment downstream, appear to outweigh the short-term impacts of the removal action. Short-term impacts include periodic exceedances of water quality criteria outside of the containment area, a limited amount of dead fish within the containment area, and the potential to have released a limited amount of contaminant mass away from the dredged area.

2. The GASCO early action provided an opportunity to the EPA project team to evaluate a number of issues raised during the project to help facilitate other remedial actions at the GASCO site or removal actions in the greater Portland Harbor Superfund Site. Since the GASCO removal action was one of the first early actions completed in the Portland Harbor, the EPA project team can use the experience gained at GASCO to provide a greater understanding of expected project concerns for dredging projects. The lessons learned from GASCO removal action should be considered in future removal actions in the Portland Harbor.

3. EPA required a relatively robust chemical monitoring program and implementation of chemical water quality criteria in the Water Quality Certification. Traditional sampling programs generally consist of field measurements, including turbidity, temperature, dissolved oxygen, and visual indicators, to assess water column impacts from dredging. The exceedances of water quality criteria during the GASCO project resulted in a number of criticisms to NW Natural and EPA from the public, environmental groups, and other entities. Based on the data collected, it is clear that the traditional field measurements would not have resulted in the perceived problems with the project. However, the criticism from the public should not discourage EPA from requiring chemical water monitoring programs. In fact, the experience at

GASCO should be used to justify additional chemical sampling in order to ensure that actual impacts to water quality are being properly assessed during early actions. The sampling program required by EPA was appropriate and effective in demonstrating the impacts to water quality from the removal action.

4. Future projects which include a chemical water quality program should include an extensive background evaluation for water quality and should be considered when establishing water quality criteria in a Water Quality Certification or other regulatory document. As observed with the GASCO project, there is potential that ambient conditions may exceed water quality criteria and may impact the ability to meet project-specific criteria. Additional background sampling would have been beneficial to evaluate the variability of ambient conditions, specifically representing various weather conditions, wave action, river flow, and upstream impacts/activities.

5. The full-length silt curtain utilized during dredging activities within the inner removal area appears to have been somewhat effective at reducing concentrations of contaminants from entering the river channel. However, the full-length silt curtain was not effective at reducing the concentrations outside the containment area to below the acute criteria established in the Water Quality Certification. For removal actions of similar contaminants and scope, additional containment technologies may be required to meet acute water quality criteria standards. Based primarily on visual observations, the full-length silt curtain appears to have contained suspended particles better than the partial length silt curtain, although no data exists to support this conclusion.

6. The partial length silt curtain utilized during dredging within the outer removal area also had some impact on water quality. Significantly lower concentrations of contaminants were observed during the outer removal operations. However, based on the data reviewed and visual indications, it appears that a significant portion of the lower concentrations detected may be attributed to the apparent flow between the partial length silt curtain and the offset bedload baffle. This gap in containment likely provided a preferential pathway for flow to occur between the contained area and the river. The lower concentrations observed downstream is likely due to dispersion and dilution of contaminants. Though water quality samples were better with the partial-length silt curtain, it appears that more contaminated particles were lost using the partial-length silt curtain than the full-length silt curtains. However, there is not sufficient data to differentiate the mass loss between the two containment systems.

7. The implementation of additional best management practices, including operational changes for dredging and material handling and installation of a barge water treatment system, resulted in an approximately 50% reduction of detected concentrations of contaminants outside the containment area.

8. Chemical water quality criteria exceedances were the primary factor in which EPA directed additional best management practices during the removal action. Other than a few minor exceedances, turbidity was not a driving factor for triggering response actions at the site. Similarly, dissolved oxygen, pH, temperature and conductivity criteria were not exceeded.

9. Although visual observations indicated that the bubble curtain may have contributed to elevated turbidity measurements, a review of the field measurement data does not support this conclusion. This may be due to the periodic nature of field sampling or the heterogeneity of the river bottom near the bubble curtain. The data indicates that turbidity was not significantly less after the bubble curtain was shut down. The most

significant impact on turbidity appears to have resulted from the change from the inner removal area to the outer removal area, which resulted in greater connection of flow between the river and the contained area.

10. It is not known whether the use of sheet pile walls would have resulted in less short-term impacts to the river than the silt curtain system. While likely controlling water quality exceedances during the dredging due to superior containment, there is potential that installation and removal of the sheet pile walls would have resulted in substantial releases. As observed throughout the GASCO project, several areas of the tar body exhibited highly mobile features and released substantial sheen at even the slightest disturbance. Further analysis would be required to fully understand the potential for water quality issues and sediment resuspension during sheet pile installation and removal. However, sheet pile containment may be a viable option for future projects, specifically for longer-term projects where the financial and logistical issues may be lessened.

11. The hydraulic dredging alternative was not considered sufficiently by NW Natural, which cited concerns with the physical condition of the tar body and other issues. It is recommended that hydraulic dredging should be considered with any future dredging projects at GASCO or other Portland Harbor sites. The significant advantages of hydraulic dredging to control potential water quality impacts may outweigh disadvantages due to financial or logistical concerns. In addition, the use of hydraulic dredging may significantly reduce the necessity of containment structures. Future dredging projects should re-evaluate this alternative, including the use of pilot tests or other means to more fully evaluate the alternative.

12. It is not known if the non-aqueous phase liquids (NAPL) observed along the shoreline cut of the removal action area is present further into the river sediment. A relatively large area of NAPL has been documented in the upland portion of the GASCO site, but has not been directly linked to in-water areas, primarily due to lack of sufficient data. The lack of observed NAPL during the tar body characterization may be associated with the sampling method or the relatively limited cores completed. The presence of NAPL, and the potential connection with the upland area should be further investigated.

13. The water quality modeling using the Kuo-Hayes model did a poor job of predicting concentrations of contaminants away from the dredge. The actual concentrations detected outside the containment area were substantially higher than those predicted, even though the model assumed that no containment would be placed. The lack of model and field correlation may be due to the presence of NAPL, insufficient number or representativeness of dredge elutriate test (DRET) samples collected, and/or deficiency in the Kuo-Hayes model to incorporate high concentrations of contaminants. Calibrating the model with actual field data may be appropriate for future actions. However, alternative models should be explored and evaluated for applicability. Based on a preliminary review, no calibrated and accepted water quality models have been identified which incorporate dredging operations with a containment component. It should be noted that pilot tests are likely to be more reliable than modeled data.

14. A total of 12 dead fish were retrieved from the primary containment area during the removal action, including one adult Coho salmon and eleven adult or juvenile non-threatened and endangered fish. No dead and/or distressed fish were observed within the outer containment area or outside the containment area during the project. The

fish take was consistent with that expected in the Biological Opinion. A total of 175 fish had been removed from the site through seining prior to the removal action. Considering that 12 dead fish (some very small) were discovered during the project, the ratio of fish removed to those potentially missed suggests that the seining was a very effective means of removing fish within the containment area, specifically considering that depths of greater than 20 feet were located in the removal areas.

15. The requirement for 72-hour laboratory analytical turnaround time and reporting to EPA was routinely not met during the project. The failure to report laboratory data in a timely manner was due to a combination of issues including, but not limited to, an increase in the number of samples collected, very low detection limits required, and the lack of project-dedicated laboratory equipment and personnel. Timely laboratory data can be critical to implementing and evaluating best management practices. Future early actions, specifically those with chemical monitoring programs that require laboratory data to make field decisions, should include specific requirements and contingencies to ensure that the agreed-upon reporting is met consistently.

16. Sediment trap information was limited during the project and appears to be inconclusive, but appears to be a viable and important method for estimating downstream impacts of dredging. EPA will consider the use of sediment traps for future removal actions to evaluate the potential loss of contaminants during a removal action. However, because of the highly variable nature of the river system and the potential impacts of in-water work to affect natural scour and depositional areas, a relatively large system of sediment traps should be deployed to be an effective measurement tool. In addition, baseline conditions should be established over a relatively long period of time to account for seasonal fluctuations, as well as the impact of tidal influences.

17. The contaminants detected in a post-construction sample collected at the offloading facility at the Port of Morrow, appears to be related to the GASCO removal action. There is not sufficient data to estimate the area of extent, but based on site observations and known activities, it is expected to be limited. In addition, based on the lack of observations of direct spills, the diligent cleanup efforts of the contractor during the offloading activities, and the time which has passed since the occurrence (11 months) and continued use of the facility by others, further evaluation or cleanup of the offloading facility does not appear to be warranted. Future removal actions should consider the importance of collecting baseline and post-construction samples from offloading facilities and/or haul routes to assess potential impacts from site activities. A statistically representative number of samples should be collected to evaluate the need for and scope of post-construction remedial actions for contaminants tracked off-site or spilled.

1. INTRODUCTION

On behalf of the U.S. Environmental Protection Agency (EPA), Region 10, Parametrix has prepared this Construction Oversight Report to document oversight activities of the non-time critical early removal action conducted at the Northwest Natural (NW Natural) facility (referred to as the "GASCO site") in northwest Portland, Oregon. The GASCO site is located along the west bank of the Willamette River within the Portland Harbor Superfund Site at approximately river mile 6.3. The vicinity of the site is shown on Figure 1. The project site is shown on Figure 2.

This Construction Oversight Report has been prepared to document the activities conducted during the early removal action and includes a summary of oversight methods, field observations, and photographic documentation. In addition, this report includes an evaluation of selected data and other site information to provide an understanding of the issues identified by the EPA project team, which can be used to guide future early removal actions at the GASCO site or other sites within the Portland Harbor Superfund Site. The EPA project team includes representatives of the EPA, Oregon Department of Environmental Quality (DEQ), Oregon Department of Fish and Wildlife (ODFW), National Marine Fisheries Service (NMFS), Tribal representatives, and Parametrix.

Northwest Natural's environmental consultant, Anchor Environmental, LLC (Anchor), prepared a Draft Removal Action Completion Report (RACR) (Anchor Environmental 2006a) which included a summary of the removal action activities and a presentation of project-related data. The EPA project team reviewed the Draft RACR and provided comments in a letter dated February 13, 2006 (EPA 2006). In general, many of the comments were related to insufficient evaluation of the project data. NW Natural addressed the comments and prepared the Final RACR (Anchor 2006b) for EPA project team review. Although the revised RACR included additional evaluation of the site data, the EPA project team indicated that further evaluation was necessary to address specific issues identified during the removal action, which can be used in a "lessons learned" approach in guiding future early removal actions. Therefore, EPA contracted Parametrix to address the missing information and include it in this report.

It is expected that this Construction Oversight Report will be used as a complimentary document to the RACR to gain an understanding of project issues. This report does not reproduce all of the data and evaluation included in the RACR. Rather, this Construction Oversight Report focuses on the specific issues identified by the EPA project team as critical components to the success of future early actions and includes only those evaluations identified as missing from the RACR or not adequately addressed in the RACR. Other documents that are related to the GASCO early removal action may provide important background information and a more complete understanding of the site action to date. These documents include the Engineering Evaluation/Cost Analysis (Anchor 2005a), the Removal Action Project Plan (Anchor 2005b), the EPA Action Memorandum (EPA 2005a) and Clean Water Act 401 Water Quality Certification (EPA 2005b), and the Biological Opinion (NMFS 2005), and can be downloaded from:

http://yosemite.epa.gov/r10/cleanup.nsf/6d62f9a16e249d7888256db4005fa293/30e48bd949cf7508882571420008affd!OpenDocument

1.1 PROJECT BACKGROUND

The GASCO site consists of approximately 35 acres and is located along the west bank of the Willamette River, south of the St. Johns Bridge at approximately river mile 6.3. The site, currently owned by the Northwest Natural Gas Company, the assumed name of the Portland Gas and Coke Company (GASCO), is located adjacent to the Wacker Siltronic and U.S. Army Corps of Engineers U.S. Moorings facilities (Figure 1). The project site is shown on Figure 2.

The EPA identification number for the GASCO site is CERCLIS - OR027734359. The site is within the boundaries of the Initial Study Area of the Portland Harbor Superfund Site, which was listed on the National Priorities List (NPL), pursuant to Section 105 of CERCLA, 42 U.S.C § 9605 on December 1, 2000. NW Natural is one of ten parties that signed a consent order for remedial investigation/feasibility study (RI/FS) activities with EPA in September 2001.

The GASCO site is the location of a former manufactured gas plant that deposited tar refining wastes into upland retention areas during the early 1900s. The waste material, by way of an onsite stream channel, was also deposited in low lying areas of the site and along the banks of the Willamette River. By the time the plant was shut down in 1956, an estimated 30,000 cubic yards of waste material had accumulated in the upland ponds, which were buried under 10 feet of fill in 1973. Remedial investigations conducted at the site confirmed the presence of tar to depths of approximately 70 feet and tar wastes extending into the river sediments. Sediment samples were found to contain high concentrations of polynuclear aromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), and cyanide. A visible tar body, which contains the highest concentrations of total PAHs (tPAHs), is located just east of the dock area along the GASCO shoreline (Figure 2).

NW Natural entered into an Administrative Order on Consent (AOC) with the EPA in April 2004 to perform a time-critical removal action of the tar body. Subsequently, NW Natural prepared a Removal Action Work Plan (RAWP) in August 2004 to outline the scope and objectives of the removal action. Planning and preliminary design of the removal action was initiated in May 2004 and as part of this process, NW Natural conducted a removal action characterization of the tar body in July 2004. The characterization involved the collection of subsurface cores within the removal area in order to:

- Establish the lateral and vertical extents and the physical characteristics of the tar body;
- Estimate elutriate concentrations in the nearby water column that may occur during the removal action;
- Profile the contaminated materials to be removed to determine disposal options; and
- Determine the chemical and physical characteristics of the sediments residing within and beneath the visible contaminated strata.

Planning and preliminary design of the removal action continued through November 2004 when NW Natural submitted a Draft Removal Action Project Plan (RAPP) that further outlined the scope, means and methods of the removal action based on data obtained during the July 2004 characterization effort. The proposed method for removal of the tar body presented in the Draft RAPP included conventional dredging with the use of in-water permeable and impermeable silt curtains surrounding the removal area.

Upon review of the RAPP, the EPA project team indicated concerns relating to the use of silt curtains as the primary containment method and indicated that sheet pile containment should

be evaluated. As a result of this dispute, and as required by CERCLA for actions taking greater than 1 year, the EPA required NW Natural to prepare an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate the containment alternatives. The evaluation in the EE/CA indicated that the silt curtain containment (a revised design and more robust system than initially presented in the Draft RAPP) would meet the project objectives and primary criteria evaluated in the EE/CA. NW Natural subsequently submitted the EPA-approved EE/CA in May 2005 for public review. Following solicitation of public comment on the Draft EE/CA, the proposed removal action was approved by the EPA in the Action Memorandum (EPA 2005a). The Final RAPP was submitted to the EPA in July 2005 and the removal action was implemented in August 2005.

In general, project documentation and planning was adequate to complete the removal action and consistent with other EPA projects of similar scope. All project design documents were reviewed and approved by the EPA project team. However, several components of the design (i.e. the silt curtain containment system and impacts to water quality during dredging) were based on significant assumptions and/or modeled results. As discussed in Section 3.0, additional information and/or pilot scale exercises may have resulted in less design shortcomings. However, it should be noted that due to site-specific and complex conditions, some projects cannot be completely understood prior to initiating an action.

The GASCO removal action is considered an "early action" because it is being conducted before the RI and record of decision (ROD) are completed for the site. Therefore, it is not considered a final cleanup remedy for the GASCO site.

1.2 REMOVAL ACTION SUMMARY

The scope and nature of the GASCO removal action is outlined in the RAPP (Anchor 2005b). Per the Statement of Work (Appendix 3 to the AOC), the final project design presented in the RAPP includes: 1) a presentation of all sampling results, quality assurance reviews, and other data evaluations, and 2) various plans to support the implementation of the removal action. The RAPP included the following appended documents:

- Transportation and Disposal Plan
- Construction Health and Safety Plan
- Construction Quality Assurance Plan
- Construction Water/Sediment Monitoring Plan
- Removal Action Environmental Protection Plan
- Monitoring and Reporting Plan

As detailed in the Final RAPP, the project included the removal of approximately 15,000 yards of contaminated tar material. The volume of contaminated material (referred to as the "dredge prism") was approved by EPA during the project planning stages. In general, the removal action involved the use of a derrick-mounted dredging crane, 15 cubic yard closed cable arm bucket and/or 8 cubic yard clamshell bucket, and associated supporting barges. The dredged sediment was amended with drying agent, loaded onto barges, and transported to the offloading facility at the Port of Morrow in Boardman, Oregon. The dredged sediment was then transferred to trucks and hauled to the Chemical Waste Management Northwest Subtitle C landfill in Arlington, Oregon.

The removal action was designed to proceed in two stages, the first occurring within an inner removal area (near shore) and the second in an outer removal area (river-ward). The inner and

outer removal areas and equipment configurations are shown on Figures 3 and 4, respectively.

The inner containment area mechanism was comprised of full-length silt curtains (water surface to river bottom), with impermeable curtains used along the portion of the containment parallel to the river and permeable curtain used along the "legs" of the containment, perpendicular to the river. The outer containment mechanism utilized a partial length impermeable silt curtain suspended from the surface to approximately 2-feet above the river bottom. A bed-load baffle was anchored to the river bottom extending upward into the water column. Another curtain was located along the outer edge of the project area and was comprised of an oil boom with a 2-foot impermeable skirt hanging downward. Oil sorbent booms were situated throughout the project area, along the perimeters of both containment areas and in areas from where tar sheen either emanated (shore edge) or accumulated. Detailed specifications of the containment barriers are presented in the RACR (Anchor 2006b).

2. REMOVAL ACTION OVERSIGHT

This section presents a brief summary of the methods and observations made during oversight of the removal action. Critical components and the associated issues encountered during the removal action are discussed in Section 3.0.

2.1 METHODS

At the request of EPA, Parametrix provided daily oversight of the removal action throughout the duration of the project. Parametrix initiated daily oversight starting on August 22, 2005 and continued through October 31, 2005. In general, Parametrix personnel were on-site during all site operations. However, some events, including mobilization/demobilization, maintenance conducted after hours, and other non-critical components of the project were not directly observed. Oversight generally involved performing a physical inspection of the site every morning and evening, and observing all site activities throughout the day, including direct (on boat) observation of water quality sampling conducted offshore. Parametrix field personnel routinely interacted with NW Natural, Anchor, and its' subcontractors to implement EPA field directives or to rectify issues observed throughout the project. Progress of the project and details of site activities were continually reported by field personnel to the Parametrix project manager. An e-mail progress summary and photograph log of site activities were submitted to the EPA project team on a daily basis. Additionally, teleconferences with the EPA project team, as well as NW Natural and its' subcontractors, were conducted on an as needed basis to discuss ongoing issues or decisions during the project.

Parametrix personnel also provided oversight of the transfer facility operation at the Port of Morrow in Boardman, Oregon. A total of six visits (some including several days) were conducted. During these visits, full-time daily observations were conducted including a physical inspection of the site every morning and evening, and observing all site activities throughout the day, including direct (on boat) observation of water quality sampling conducted offshore. The sediment disposal location, Chemical Waste Management Northwest facility in Arlington, Oregon, was also visited once by Parametrix personnel, who were accompanied by the Chemical Waste Management project manager.

Documentation of oversight activities include field notes, daily e-mail progress reports to the EPA project team, and photographs taken throughout the project. Copies of the field notes and daily e-mail project updates are included as Appendix A and Appendix B, respectively. Photographs taken throughout the project, which are organized by each day, are included on the compact disc in Appendix C.

2.2 GENERAL OBSERVATIONS

A detailed description of the removal action activities is included in the RACR. Documentation of the oversight activities and observations are included in Appendices A through C in this report. A brief summary of the general observations of the removal action is presented below.

2.2.1 Schedule

A project kick-off meeting was held on August 22, 2005, which was attended by representatives of NW Natural, Anchor, construction subcontractors (Sevenson Environmental Services, Hickey Marine, Tidewater, Northwest Underwater Construction),

DEQ, and Parametrix. The removal action field activities were initiated on August 24, 2005. Initial activities included mobilization, site preparation, and installation of the containment system (silt curtains and bubble curtain).

Dredging within the inner removal area was initiated on September 7, 2005 and continued through October 9, 2005. Concurrent with the last days of dredging the inner removal area, the contractor installed the outer containment system. After a final bathymetry survey was approved for the inner removal area, dredging of the outer removal area was initiated on October 12, 2005 and proceeded until October 19, 2005. A final bathymetry survey was completed and approved by EPA on October 20, 2005. Placement of capping material then proceeded until October 30, 2005. Demobilization activities proceeded from October 30, 2005 through November 4, 2005.

Due to a number of work shutdowns and delays, which occurred due to the discovery of dead fish in the containment area and exceedances of water quality criteria outside the containment area, as well as a shortage of available transport barges, the removal action generally proceeded behind schedule during the initial portion of the project. Dredging of the outer removal area and placement of the capping material was completed relatively quickly at the end of the project, which allowed NW Natural to makeup for several days of delays. The expedited schedule was primarily due to the fact that some portions of the outer containment system could be placed concurrently with final dredging of the inner area, the outer area volume was significantly less than the inner removal area volume, and most of the issues resulting in delays during the early portions of the project had been rectified. Although NMFS issued a Biological Opinion Amendment, which would allow NW Natural to conduct limited work beyond the in-water fish window (July 1 through October 31), all capping was complete by October 30, 2005. Limited site activities, primarily related to demobilization, occurred after the in-water fish window construction period. It is not expected that actions conducted after the fish window closure had any adverse impact on aquatic life or environmental conditions in the river.

One of the limiting factors related to the schedule was the availability of transport barges. The transfer of material by barge to the Port of Morrow takes approximately one day to complete and one day for return. Due to the unanticipated length of time in which it took the barges to be unloaded at the transfer facility, the turnaround time for barges took up to one week. Issues related to unloading delays include the characteristics of the dredged material (i.e. there was some initial trial and error regarding addition of cement to get the correct consistency), best management practices used to limit spills/releases (which limited the speed in which the material could be unloaded), and the availability of trucks to transport the material to the landfill. The schedule implemented by NW Natural had adequate flexibility to deal with the time delays. However, the lack of available barges (three barges were being used throughout the project) may have prolonged the removal action unnecessarily.

Field directions from the EPA also resulted in delaying the schedule. After it was discovered that non-aqueous phase liquid (NAPL) was present on the exposed shoreline cut, the EPA directed that an organoclay mat be installed to control the seeps, prior to placement of the pilot cap. Placement of the organoclay mat is estimated to have delayed the removal action approximately one to two days, due to material procurement and delivery, and use of dredge equipment/personnel to place the mat. In addition, the implementation of the barge water treatment system, which was required by the Biological Opinion after water quality exceedances were identified downstream of the containment area, also impacted the project schedule. Conditions of the Biological Opinion required that the system be implemented prior to re-starting dredging activities, resulting in approximately two days of equipment procurement and installation. A relatively small area (less than 100 cubic yards) of visibly

contaminated material outside the dredge prism was also requested by EPA to be removed. This did not significantly delay the removal action implementation.

2.2.2 Dredging

A total of approximately 15,300 cubic yards of tar and tar-contaminated sediment were removed during the GASCO removal action. The dredged material was shipped via barge to the Port of Morrow in Boardman, Oregon, and offloaded into trucks and hauled under manifest to the Chemical Waste Management Northwest Subtitle C landfill in Arlington, Oregon.

Dredging of the tar and tar sediments was performed using a derrick-mounted dredge crane equipped with a clam-shell type dredge bucket or a closed cable arm bucket. The nature of dredge material dictated which dredge buckets were utilized. When practicable, the closed arm bucket was employed as part of utilizing best management practices (BMPs). Based on estimates from Sevenson Environmental Services (the dredging contractor), approximately 1,600 to 2,000 cubic yards of material was removed with the cable arm bucket and approximately 13,300 to 13,700 cubic yards were removed with the clamshell bucket. Because there were a number of changes between the closed cable-arm bucket and clam-shell bucket, and only one chemical water quality sample set was collected per day, no definitive conclusions can be made as to whether the changes impacted dissolved chemical water quality. However, visual observations (which could not be definitely corroborated with field measurements) indicated that there was somewhat less disturbance and/or less turbidity using the closed cable-arm bucket.

Impacts to river water quality appear to have been affected by dredging methods. As such, the most critical component to successfully removing the tar body while minimizing impacts to water quality greatly relied upon BMPs employed by the dredging contractor. In general, the dredge operators employed the standard dredging controls, and, when directed, were diligent at employing additional/modified BMPs. However, there were isolated instances when the dredging production rate resulted in a failure to implement some of the BMPs. Examples of these occurrences are as follows:

- Over-filling of dredge bucket: At the onset of the removal action, several instances of overfilling of the dredge bucket were observed. These instances were generally related to variations in consistency/hardness of the dredge material. The dredge buckets available (clam shell, cable arm) have their respective applications based on the physical characteristics of the tar body or sediment. The cable arm bucket, with the advantage of being a lighter closed bucket, does not, however, effectively cut into harder material. The conventional clamshell bucket, being much heavier and equipped with tines, would on occasion be overly effective at biting into the tar material, resulting in over-filled buckets. As such, the dredge operator was at the limits of the available equipment due to the heterogeneous nature of the tar deposit and sediments. However, overfilling of the dredge buckets were substantially minimized as the project progressed.
- Dragging of bucket on river bottom: On one occasion, during the latter half of the project, the dredge operator was observed to be moving the dredge bucket in a fashion that suggested the operator was dragging the dredge bucket along the river bottom, which was prohibited as part of BMPs. However, discussion with the contractor indicated that the operator was not dragging the bucket, but rather looking for "high spots." With the bucket suspended at a specified depth the contractor moved the bucket back and forth to ensure the desired dredging depth had been

achieved. Although not in contact with the river bottom, the contractor was directed to cease that type of activity.

- Splash dunking of the bucket: On one occasion the dredge operator aggressively splash dunked the dredge bucket in the river to clean off material at the end of the day, prior to placing the bucket on the derrick. This appeared to be an isolated instance, but the operator was directed to cease that practice. Subsequently, the bucket was decontaminated with hose water on the transfer barge, or simply placed on the derrick when there was little or no residual dredge material adhering to the bucket. Additional occurrences were not observed.
- Cycle time: On occasion it was noted that an increased dredging production rate resulted in a failure to implement some of the BMPs. As a result, the contractor was regularly reminded of the required pace by the EPA contractor and would respond accordingly.

Observations and discussion of additional BMPs are further described in Section 3.9.

2.2.3 Final Grade/Capping

Bathymetry surveys were conducted throughout the removal action to monitor the dredging depths, and were also utilized at the end of the project to confirm the final elevations achieved. Additionally, final confirmatory depth and thickness surveys were conducted manually using a lead line. Completion of the removal action involved placing an organoclay mat along the dredging cut-face at the rivers edge, followed by a pilot cap (quarry spall) over the dredge prism. The entire inner removal area was then overlain by a layer of fringe cap material (sand) up to the 10-foot high water line on shore. Thickness of cap placement was verified by bathymetry survey and diver survey.

Upon completing placement of the fringe cap, the containment structures (silt curtains, anchors, bubble curtain, etc.) were removed and treated as solid waste. Onsite trailers and ancillary equipment were removed from the site. In general, no significant issues were observed with the final grade of the site, capping material and procedures and/or demobilization.

2.2.4 Transfer Facility

Demobilization and decontamination of equipment at the offloading facility in Boardman, Oregon, was completed approximately 10 days after work was completed at the GASCO site. Decontamination of barges, machinery and equipment at the offloading facility was done using pressure washers. Washing of equipment (excavator buckets, front-end loaders, etc.) was performed by placing the equipment inside the haul barge such that the waste water was captured. The water was then pumped to a vacuum truck and hauled offsite to the Arlington disposal facility. All of the material containment equipment used at the site (lay down mats, visqueen, hay bails, cover soil, etc.) was removed and hauled offsite. The area was then graded to its' original condition. No significant issues were observed with operations of the transfer facility.

Soil samples were collected from the transfer facility to evaluate whether spills or releases had occurred during the removal action. Transfer facility post-construction sampling is further discussed in Section 3.11.

3. DATA EVALUATION AND PROJECT REVIEW

During the course of the removal action, a number of issues were identified by the EPA project team that requires additional evaluation beyond that included in the RACR. These issues include design elements (containment system), water quality criteria exceedances, best management practices, and response actions. Because the GASCO early action was one of the first early actions undertaken within the Portland Harbor Superfund Site, the EPA project team indicated that the issues encountered during the project may be helpful in guiding future early actions in the Portland Harbor. Therefore, this section is intended to provide additional evaluation, both quantitatively and qualitatively, of several specific issues identified and provide "lessons learned" that may be useful in future early actions. In addition, the lessons learned evaluation was also designed to help evaluate why the project did not perform as designed with respect to water quality exceedances and to evaluate the offsite and short-term impact of the project to the extent possible with the available data.

It should be noted that the intent of this section is not to reiterate all of the data collected during the project. The RACR provides a detailed presentation of the data and largely includes adequate evaluation of most issues encountered. This report only includes those issues which may have applicability to future actions at GASCO or elsewhere in the Portland Harbor area.

3.1 BACKGROUND WATER QUALITY SAMPLING / WATER QUALITY CRITERIA

In order to evaluate the effectiveness of any containment system to control water quality impacts due to dredging, background conditions at the site need to be fully understood. In July 2005, the EPA prepared a Clean Water Act 401 Water Quality Certification (WQC) (EPA 2005b), which included both chronic and acute water quality criteria. In accordance with the WQC, exceedance of chronic criteria during the project would result in increased monitoring and a review of dredging operations and BMPs. Exceedance of acute criteria would result in immediate project shutdown, implementation of all available BMPs, and consultation with EPA prior to re-initiating dredging operations.

Prior to the start of the project, background sampling for the WQC-required water quality constituents (semi-volatile organic compounds [SVOCs] and cyanide) were collected from three upstream locations. The results of the background sampling is included in Table 15 of the RACR and provided as part of Appendix D, Supporting Documentation in this document. In general, low to moderate levels of SVOCs were detected in the background samples collected. The chronic criteria for benzo(a)pyrene (0.014 micrograms per liter [µg/L]) was exceeded in two samples, RAA-WBGDB (0.0532 µg/L) and RAA-WBGDB (0.0485 µg/L). No acute water quality criteria were exceeded during the initial background sampling. The results indicated that low levels of project-related constituents were present upstream of the project area were at concentrations exceeding those referenced in the WQC. The presence of these compounds likely had some impact on water quality sampling results and the ability to meet project-specific criteria.

Within the first week of dredging, water quality sampling indicated elevated concentrations of contaminants downstream of the project area (see Table 17 in Appendix D). Several samples indicated concentrations of benzo(a)pyrene and benzo(a)anthracene significantly above the acute criteria established in the WQC. Based on these results, all available BMPs outlined in the RAPP were implemented. In addition, as part of the response actions, the EPA directed NW Natural to complete additional background sampling to determine if the impacts were project related. A total of eight additional background sampling locations (all containing

three different depths) were sampled on September 16, 2005 and September 29, 2005, during periods of non-dredging to try to gain a better understanding of river conditions. The additional background sampling results are shown on Table 16 of the RACR (and included in Appendix D). The chronic criteria for benzo(a)pyrene, and to a lesser extent for benzo(a)anthracene, were exceeded in most of the additional samples collected. The acute criteria for benzo(a)pyrene and benzo(a)anthracene was also exceeded in 12 of 43 samples collected and 7 of 43 samples collected, respectively.

Because the additional background sampling was conducted long after the dredging operation had been initiated at the site, it is difficult to determine whether the later samples are truly representative of background conditions. At that point in the project, the dredge prism had been significantly disturbed and new material had been exposed. The presence of the containment system, which likely included high concentrations of constituents within the contained water column, also may have contributed to leaching out of contaminants through the silt curtain (see discussion in Section 3.3.1). While the sampling was conducted during periods of non-dredging, dredging had occurred within 48 hours prior to the water quality sampling during both events.

It is important to note that NW Natural collected the additional "background" samples at the request of EPA and included the sample results as part of the presentation of background conditions in the RACR. However, this data should not be assumed by NW Natural or other parties to be truly representative of background conditions. In the event that the GASCO project is referenced for future removal actions, establishment of water quality criteria (trigger levels), and evaluation of potential impacts should be independent of the data collected during this project. Future projects which include a chemical water quality program should include an extensive background evaluation which should be considered when establishing water quality criteria in the WQC or other regulatory document. As observed with the GASCO project, there is potential that ambient conditions may exceed water quality criteria and may impact the ability to meet project-specific criteria.

3.2 WATER QUALITY SAMPLING PROGRAM

A water quality sampling program was established in the WQC to evaluate the effectiveness of the containment system and to measure the potential impacts on the aquatic environment due to the removal action. Water samples were collected concurrently for field and laboratory analysis from three depths at three pre-determined stations, typically one station upstream (300 feet from containment barrier) and two stations downstream (150 feet from the containment barrier). However, after approximately 6 days of limited dredging, a dead fish was observed in the containment area (September 13, 2005). Coupled with the exceedance of water quality criteria, the EPA immediately expanded the water quality sampling program. Figure 5 shows the various locations from which water quality samples (for both field and laboratory parameters) were collected during the removal action. Sampling locations were regularly governed by the direction of river flow. In tidal-influenced or reverse-flow conditions, which was observed periodically throughout the GASCO project, sampling locations were reversed from downriver to upriver locations, and vice-versa for the background locations.

Water quality samples were collected daily, initially after a minimum of one hour of dredging activity and then after approximately 4 hours of dredging. Samples submitted to an offsite laboratory were analyzed for a project-specific list of SVOCs and cyanide. Onsite analysis of water samples included field measurement of turbidity, dissolved oxygen, temperature, conductivity and pH, and visual observations. The additional chemical sampling required by the EPA resulted in a total of 13 locations being sampled on a daily basis during the later

stages of the project. The complete results of water quality data collected during the project are presented in the RACR (Anchor 2006b).

The robust chemical water quality sampling program required by EPA during the removal action indicated exceedances of water quality criteria listed in the WQC. While some projects have used chemical water quality monitoring, traditional sampling programs primarily rely on field measurements, including turbidity, temperature, dissolved oxygen and visual indicators, to assess water column impacts from dredging. In fact, NW Natural proposed only using field measurements during the initial draft of the RAPP. The chemical water quality program was added after negotiation with NW Natural during a formal dispute resolution. The exceedances of chemical water quality criteria resulted in a number of criticisms to NW Natural and EPA from the public, environmental groups, and other entities. Based on the data collected, it is clear that the traditional field measurements would not have resulted in the perceived problems with the project. However, the criticism from the public should not discourage EPA from requiring chemical water monitoring programs. In fact, the experience at GASCO should be used to justify additional chemical sampling in order to ensure that actual impacts to water quality are being properly assessed during early actions. The sampling program required by EPA was appropriate and effective in demonstrating the impacts to water quality from the removal action.

3.3 SILT CURTAIN CONTAINMENT SYSTEM / IMPACT ON WATER QUALITY

The in-water containment system was made up of several components including permeable and impermeable silt curtains, a bedload baffle anchored to the river bottom, floating booms and a hanging skirt on the outside of the silt curtains, and a bubble curtain around the entire perimeter of the containment area (Figures 3 and 4). One of the major issues identified during the project by the EPA project team was the relative effectiveness of the containment system to control potential impacts to water quality due to dredging and disturbance of the tar body. While the chemical data collected at the site is relatively limited, the effectiveness of the silt curtain and other components can be evaluated using the spatial distribution of contaminants detected during dredging operations. In general, benzo(a)pyrene and benzo(a)anthracene were used as indicator compounds to evaluate the water quality data. Benzo(a)pyrene and benzo(a)anthracene have the lowest water quality criteria established in the WQC and were generally detected in the majority of samples. An evaluation of the containment system effectiveness is presented in the following sections.

3.3.1 Concentration Gradient across Silt Curtain

As part of the expanded sampling effort, water samples were collected from just inside and outside the silt curtain to evaluate the concentration gradient across the silt curtain. The data is assumed to represent the relative effectiveness of the silt curtain to control the release of contaminants to the water column. The locations of the samples are shown on Figure 5.

A total of fourteen pairs of samples were collected between September 27, 2005 and October 22, 2005. Six of the sample pairs were collected during dredging of the inner removal area to evaluate the effectiveness of the full length silt curtains and eight sample pairs were collected during dredging of the outer removal area to evaluate the partial length silt curtains. The results are discussed in the following sections.

3.3.1.1 Full Length Silt Curtain Effectiveness

It should be noted that the samples collected inside and outside of the full length silt curtain were collected in the downstream location where the permeable silt curtain was located

(Figure 5). As shown on Table 1 and Figure 6, the average concentration of benzo(a)pyrene detected in water samples collected from inside and outside the full-length silt curtain during dredging was 10 µg/L and 1 µg/L, respectively. The percent reduction across the silt curtain ranged from 36.4% to 99%, with an average percent reduction of 80.4% (Table 1).

The limited data indicates that the full-length permeable silt curtain was relatively effective at reducing the concentrations released to the water column during dredging. The average concentration of benzo(a)pyrene observed within the contained area was approximately 40 times the acute criteria established in the WQC. Because the silt curtain perpendicular to the river was constructed of permeable fabric, it was not expected that such a high buildup of contaminants would occur within the containment area. Field and diver observations during dredging indicated that a large amount of silt buildup was observed on this portion of the curtain, which may have reduced the permeability. As such, the silt curtain appears to have been very effective at containing suspended solids, relative to the partial-length silt curtain used in the outer removal area. Visual indications of the water within the containment area indicated very turbid conditions. However, field measurements of turbidity at the downstream compliance point did not indicate significant exceedances of the turbidity criteria at any time during the project.

Although there was a relatively large concentration gradient across the silt curtain which indicates its relative effectiveness, it is important to note that the silt curtain was not effective at reducing the concentrations outside the containment area to below the acute criteria established in the WQC.

3.3.1.2 Partial Length Silt Curtain Effectiveness

As shown on Table 1, the average concentration of benzo(a)pyrene inside and outside of the partial length silt curtain was 0.6 µg/L and 0.2 µg/L, respectively. The percent difference across the silt curtain ranged from an increase of 153% to a reduction of 85%, with an average reduction of 26%.

The variability of the limited data set is likely due to the use of partial silt curtain for the outer containment design. The design called for the silt curtain to hang approximately 2 feet above the river bottom. A bedload baffle, set on the interior side of the silt curtain and offset approximately 10 feet, extended from the river bottom upward into the water column (see Figure 4). The resulting gap between the containment structures likely allowed flow to occur between the contained area and the river channel. It is not expected that the contaminant concentration or dissolved-phase contaminants released from the tar body was significantly different in the outer dredge prism area. Therefore, the significantly lower concentrations observed within the containment area, and similar concentrations on the outside of the containment area, were likely due to the equalization of contaminants due to the flow beneath the silt curtain.

It is important to note that the benzo(a)pyrene concentrations observed outside of the containment area were slightly above the acute criteria. The lower concentrations observed in the water column outside the containment area should not be attributed to the effectiveness of the silt curtain. More likely, the low concentrations observed are due to the dispersion and dilution of contaminants. It appears that more contaminated particles were lost using the partial-length silt curtains than the full-length silt curtains. However, there is not sufficient data to differentiate the mass loss between the partial and full-length silt curtains.

3.3.2 150 Feet Downstream of Containment Area

Assessment of impacts to river water quality were based on contaminant concentrations detected at sampling stations situated along an arc 150-feet downstream of the primary containment area. These sampling stations included RAA-WCD1 through RAA-WCD3 during normal flow conditions and RAA-WCU4 through RAA–WCU6 during reverse flow conditions. Figures 7 and 8 show the concentration of benzo(a)anthracene and benzo(a)pyrene detected at 150 feet downstream of the containment edge at the surface, middle, and bottom depths throughout the project. Figures 7 and 8 also include the acute criteria established in the WQC.

The acute criteria for benzo(a)anthracene (0.49 µg/L) and benzo(a)pyrene (0.24 µg/L) were generally exceeded throughout much of the dredging phase of the project. Typically, the concentrations detected were highest in samples collected from the bottom depths (approximately 1 foot above river bottom) and lowest in samples collected from the top of the water column (approximately 1 foot below surface). The 95% upper confidence limit (UCL) was calculated for specific data sets, including initial stages of the project prior to implementation of BMPs, after implementation of all BMPs, and dredging of the outer containment area.

The 95% UCL for concentrations of benzo(a)pyrene and benzo(a)anthracene were significantly higher than the acute criteria during the initial stages of the project. As required in the WQC and further discussed with the EPA project team, BMPs were necessary to limit the water quality impacts. Some of the BMPs employed at the site included:

- Moving the bucket more quickly from the water surface to the transfer barge to allow less of the water to drain back into the water column;
- Increasing the dredge cycle time within the water column, including slower descent and ascent of the dredge bucket;
- Minimizing overly full buckets;
- Installation of a dewatering treatment system on the barge to treat dredge water prior to discharging it to the contained area; and

Twelve days into the dredge project (September 19, 2005), all available BMPs were operational. Additional water quality sampling was directed by EPA to measure the effectiveness of the BMPs. Based on the data collected, it appears that the additional BMPs had a significant effect on water quality. As shown on Figures 7 and 8, the 95% UCL was significantly lower than previously observed. However, the concentrations of benzo(a)pyrene and benzo(a)anthracene still exceeded the acute criteria established in the WQC.

Once the outer removal area containment system was initiated, significant decrease in benzo(a)pyrene and benzo(a)anthracene concentrations were evident (Figures 7 and 8). Much of the decrease can be attributed to the nature of the outer containment system. However, it is important to reiterate that although the water quality results appear to be better for the outer removal area (and partial silt curtain system), it should not be concluded that it is a better control for the release of contaminants. As previously discussed, the outer containment system utilized a partial silt curtain, coupled with a bedload baffle. A relatively large gap was present between the silt curtain and bedload baffle, which likely allowed flow of water from the containment area to the river channel. This flow allowed the dispersion of the contaminants from the containment area. The contaminant concentrations observed just inside and outside the silt curtain supports this conclusion.

After the dredging was complete, water quality samples were collected during installation of the pilot cap. As shown on Figures 7 and 8, the concentrations of benzo(a)pyrene and benzo(a)anthracene were very near or below the acute criteria during this time period.

3.3.3 600 Feet Downstream of Containment Area

Due to water quality exceedances observed at the 150 foot sampling station, the EPA directed NW Natural to collect water quality data further downstream to evaluate the lateral dispersion of contaminants. A sampling station was established approximately 600 feet from the containment barrier (Figure 5). Data collected from the 600 foot downstream station includes 15 data points (with top, middle, and bottom sampling depths) collected between October 12, 2005 and October 29, 2005. A total of eight samples were collected during dredging of the outer area with the remaining samples collected during installation of the pilot cap. The analytical results are included on Table 2.

The results show relatively low concentrations of benzo(a)pyrene and benzo(a)anthracene in the farthest downstream samples collected. However, the acute criteria for benzo(a)pyrene was routinely exceeded for samples collected at the bottom depth. When compared to the samples collected at 150 feet downstream during the same time period, the results are not significantly different. Thus, it can be concluded that impacts were dispersed downstream to some extent. The lateral extent in which water quality was below acute criteria is unknown.

3.3.4 Turbidity

In the majority of dredging projects, specifically within EPA Region 10, turbidity has been a primary parameter used to measure impacts to water quality. As evidenced by the GASCO project, chemical analysis is costly and generally cannot be completed in real-time. It has been generally thought that turbidity can be correlated with chemical data and can be used as an indicator of water quality impacts. However, because of the highly concentrated chemical makeup of the tar body and the unknown effectiveness of the designed containment system, the EPA required NW Natural to include a relatively robust chemical monitoring program. Field measurements (turbidity, DO, and temperature) were also measured extensively throughout the project.

3.3.4.1 Correlation with Chemistry Data

Figures 8 and 9 show the maximum turbidity measured an any given day (at the same sampling station) overlain with the benzo(a)anthracene and benzo(a)pyrene data collected throughout the project. In general, the daily maximum turbidity observed correlated with the detected benzo(a)pyrene and benzo(a)anthracene concentrations throughout the duration of the project (i.e. spikes in turbidity were typically matched by spikes in chemical concentrations). However, the data is somewhat variable and the correlation is only general in nature. For the data set collected during this project, it is not expected that a specific turbidity measurement can predict a chemical concentration of either benzo(a)anthracene or benzo(a)pyrene.

The correlation is even less pronounced after the outer removal area containment system was initiated. It appears that this is due to the dilution/release of water within the dredge area to the river channel from beneath the partial silt curtain/bedload baffle system. Once the capping phase of the project commenced, there is no apparent correlation of turbidity to chemical concentrations. The detected concentrations of benzo(a)pyrene and benzo(a)anthracene dropped substantially while turbidity increased significantly due to the large amount of sand material being placed into the river.

It was anticipated that turbidity would be one of primary water quality certification triggers for requiring additional BMPs. However, based on the observed background turbidity levels and the associated 95% UCL of 17 NTU, turbidity was, on average, below this limit throughout the project. As such, other than a few small exceedances by less than 5 NTU, turbidity did not become a trigger for the project. Similarly, dissolved oxygen, pH, temperature and conductivity were not exceeded. The EPA requirement for chemical testing ultimately drove the requirement for implementing all available BMPs.

3.3.4.2 Effect of Bubble Curtain on Turbidity

In order to prevent fish passage into the removal action area, the perimeter of the site was lined with a bubble curtain. The mechanism involved forcing compressed air into pipes, which was laid on the mudline surface, in which holes were drilled. The compressed air would rise to the surface of the river through the holes in the pipe, thus creating a "curtain" of bubbles around the site. The RACR indicates that the use of the bubble curtain impacted the water quality in the area, primarily by increasing turbidity. A review of the turbidity data during operation of the bubble curtain and shut down of the bubble curtain was reviewed. The visual indications of increased turbidity near the bubble curtain (which was noted by both Anchor and Parametrix field personnel throughout the project) do not appear to be substantiated by the actual field measurements.

The bubble curtain was continuously used from September 5, 2005 to October 12, 2005. The maximum turbidity reading during the two week period leading up to October 12, 2005 (September 27 through October 12) was 12 NTU, with an average turbidity reading of approximately 6 NTU. The bubble curtain was turned off on October 12, 2005 and approximately six days of dredging were completed without the bubble curtain in place. The maximum turbidity reading throughout this period was 12 NTU, with an average turbidity reading of approximately 5 NTU. A review of the data indicates that turbidity was not significantly less after the bubble curtain was shut down. The most significant impact on turbidity appears to have resulted from the change from the inner dredge area to the outer dredge area.

3.3.5 Physical Stresses on Containment System

There was a concern as to whether the silt curtain could physically withstand river forces. Per the silt curtain manufacturer, a river velocity of 1 foot-per-second (fps) was established as the maximum allowable river velocity that the silt curtain could withstand and below which dredging could proceed. Per the WQC, a river velocity greater than 1 fps would trigger work stoppage. River velocity did not exceed 1 fps during the removal action. As such, it can be concluded that the silt curtain was strong and anchored well enough to withstand the anticipated river forces.

However, there were failings of the silt curtain that resulted from forces other than those generated by the river. Failings of the silt curtain included tears, isolated billowing of the contractor access gate, temporary submergence of the upper silt curtain flotation device, and an instance of a river-bottom anchor being pulled out. These failings were attributable to errors in design and/or human error and are discussed below.

Tears in the silt curtain and failing of one of the anchors occurred during repositioning/maneuvering of equipment close to the curtain. The tears resulted from the curtain catching on the corner of the derrick during repositioning. The anchor came loose as a result of tug wash during maneuvering of a 700-foot tanker vessel immediately adjacent to the curtain. Both situations were immediately corrected by the contractor.

Billowing of the silt curtain and the resulting temporary passage through the containment structure was observed at the contractor access gate (see photograph in Appendix C). This was observed during the latter half of the removal action while dredging in the outer removal area. In this instance, reverse river flow conditions and subsequent forces resulted in billowing of the top portion of the gate mechanism (upper 14-foot portion), effectively creating a gap below the upper portion and the silt curtain anchored on the river bottom. Billowing of the access gate was not observed during normal river flow conditions. As a result, since the billowing of the curtain occurred only during reverse flow conditions, river water was capable of only entering the containment area, as opposed to exiting through the contractors' gate. Nonetheless, it was a failure in design which could increase the release of contaminants to the river.

In order to rectify the billowing of the access gate, the mechanism was modified with the addition of weights and a strapping mechanism that was effective at keeping the top portion of the silt curtain hanging to the desired depth. In addition, usage of the access gate was reduced, utilized only when barges of capping material were maneuvered into the inner containment area. Future removal actions with silt curtains should consider these design issues.

Submergence of the upper silt curtain flotation boom was observed during the early stage of the dredging process upon removal of material from the river-ward edge of the inner removal area. With the creation of a low lying area immediately inside the silt curtain, bottom material immediately outside of the inner silt curtain sloughed towards the low lying area, pulling the bottom of the silt curtain downward, drawing the silt curtain taught and resulting in submergence of the flotation boom. The boom typically was submerged less than a foot below the water surface. This was promptly corrected.

Positioning of the transfer barge immediately adjacent to the silt curtain may have also contributed to submergence of the flotation boom by coming in contact with the tie-back cables extending river-ward from the silt curtain. It appeared that as the transfer barge was loaded and its draft increased, the bottom of the barge would contact the tie back cables, drawing the curtain taught and further exacerbating the issue of submergence. Submergence of the silt curtain was rectified by placing a similar stretch of full-length curtain on the shore-ward side and anchoring it to the bottom, effectively "doubling up" the curtain. Submergence of the secondary stretch of silt curtain did not occur and visual monitoring of the additional curtain did not indicate passage of sheen or water flow in this area of the containment structure.

3.4 ALTERNATIVE TECHNOLOGIES

The EPA project team indicated that it may be appropriate to provide a brief evaluation of alternative technologies.

3.4.1 Comparison to Sheet Pile Containment

During the planning stages of the project, the EPA project team initially indicated that a sheet pile containment system may be best suited to control the relatively mobile contaminants expected to emanate from the tar body during dredging. NW Natural indicated that the silt curtain system would meet the project objectives. As a result of the dispute, the silt curtain and sheet pile containment systems were evaluated in the EE/CA (Anchor 2005a). Based on the evaluation, the silt curtain system was selected, primarily due to the significantly higher costs and logistical issues with sheet pile wall fabrication and installation/removal. The silt

curtain design included in the EE/CA was a more robust system than originally presented to EPA in the Draft RAPP.

As discussed in previous sections, a number of water quality criteria exceedances were observed throughout the GASCO project, even with the installation of a robust silt curtain containment system. It is not known whether the sheet pile walls would have resulted in significantly different water quality impacts. In order to properly evaluate the two containment systems, a comparable sheet pile wall project must be identified. That is, the contaminants should be similar (constituents, mobility, concentration, etc.) and adequate water quality monitoring data should be available. However, based on a limited review of dredging projects conducted throughout the U.S., Parametrix could not identify any comparable projects, primarily due to the lack of chemical water quality monitoring. Therefore, a direct quantitative comparison can not be made.

Concerns associated with the implementation of a sheet pile containment system include the logistics of fabricating and transporting the sheet pile walls, time constraints of manufacturing and placement (which would have delayed the GASCO project up to a year), and the potential for contaminant releases during placement and removal of the sheet pile walls. Many of these concerns were evaluated in the EE/CA (Anchor 2005a), which resulted in the selection of the silt curtain alternative.

It is unknown whether that the use of sheet pile walls would have resulted in less short-term impacts to the river. While likely controlling water quality exceedances during the dredging due to superior containment, there is potential that installation and removal of the sheet pile walls would have resulted in substantial releases. As observed throughout the GASCO project, several areas of the tar body exhibited highly mobile features and released substantial sheen at even the slightest disturbance. The installation of sheet pile wall would likely exacerbate contaminant releases. In addition, during removal, there is potential that releases could occur due to smearing of the tar body onto the sheet pile as it is pulled out of the river. Some of these concerns may be rectified by the installation of secondary containment systems during installation and removal. Further analysis would be required to fully understand the potential for water quality issues and sediment resuspension during sheet pile installation and removal. In addition, the concentration buildup of contaminants within the sheet pile containment area (which was observed using the silt curtains) must be considered after the project is complete. Treatment of the water may be possible, but would likely significantly increase overall project costs.

The removal action would also have been delayed for at least one year due to the logistical considerations of equipment procurement, sheet pile wall fabrication, and the available in-water construction window. In the absence of any actions for one year, it is expected that the low concentration releases from the tar body would continue.

Although a direct comparison of the containment systems can not be made, sheet pile containment may be a viable option for future projects. The financial and logistical issues with sheet pile walls may be lessened for longer term dredging projects. Considerations for release of contaminants during installation and removal may be rectified with the addition of other containment mechanisms during these periods. The type of contaminants and the relative effectiveness of the silt curtain containment at GASCO should be considered when evaluating other containment alternatives.

3.4.2 Hydraulic Dredging

Dredging during the GASCO project utilized a combination of clamshell and cable arm bucket technologies. Both of these technologies resulted in significant disturbance of the

dredged sediment and contributed to releases of contaminants to the water column. When properly applied, the cable arm bucket, being a closed system, was observed to be much better at controlling releases due to significantly less interaction between the material in the bucket and the water column as it is raised to the surface. However, when the cable arm bucket was not fully closed, some sediment (although less than observed with the clamshell) was released during movement to the surface. Due the consistency of the GASCO tar body, the cable arm bucket could only be used for approximately 10% of the dredged volume. It is estimated that approximately 1,600 cubic yards to 2,000 cubic yards of the total 15,300 cubic yards was dredged with the cable arm bucket.

Hydraulic dredging was considered during the early stages of the RAPP and EE/CA analysis. However, hydraulic dredging was quickly dismissed by NW Natural, which cited concerns with the physical condition of the tar body (i.e. areas of hard brittle tar, etc.) and other logistical concerns, including dewatering the sediment and management of decanted water. However, hydraulic dredging should be considered with any future dredging projects at GASCO or other Portland Harbor sites. The significant advantages of hydraulic dredging to control potential water quality impacts may outweigh disadvantages due to financial or logistical concerns. In addition, the use of hydraulic dredging may significantly reduce the necessity of containment structures. Future dredging should re-evaluate this alternative, including the use of pilot tests or other means to more fully evaluate the alternative.

3.5 OBSERVANCE OF NAPL/SHEENS

Based on the information collected during the tar body characterization, NW Natural indicated in the RAPP that sheens from the dredging process would be limited. However, sheens emanating from the tar material were present throughout the removal process. Any contact with the tar material by the clamshell resulted in a surface sheen. In addition, boat wash directed towards the dredge material or bottom sediments also resulted in surface sheens on a number of days. Although the containment structure incorporated sorbent booms deployed around the perimeter of the inner containment area, it was not anticipated that sheens would be produced to such a degree.

Promptly upon observing the high level of sheening within the first week of dredging, additional sorbent booms were deployed within the inner containment area. Additionally, EPA requested sorbent booms be changed out as soon as they appeared saturated or ineffective at absorbing the sheens. Spent sorbent booms were included with the dredge material hauled offsite and treated as hazardous waste. No sheens were observed migrating outside the sorbent booms and the inner containment area throughout the duration of the removal action. Prior to switching to the outer removal area, sheens remaining in the inner area were skimmed using sorbent boom and mopped up.

Non-aqueous phase liquids (NAPL) were not observed during the characterization of the tar body. However, NAPL was observed along the cut face of the shoreline area. Based on these observations, the EPA directed NW Natural to install an organoclay mat over the area, prior to backfilling with cap material. Details of the organoclay mat are included in the RACR (Anchor 2006b).

It is not known if the NAPL observed along the shoreline continues into the dredge prism. However, based on the substantial amounting of sheening, as well as observations of the tar material removed, there is potential that NAPL is present beneath the river. A relatively large area of NAPL has been documented in the upland portion of the GASCO site, but has not been directly linked to in-water areas, primarily due to lack of sufficient data. The lack of observance of NAPL during the tar body characterization may be associated with the

sampling method or the relatively limited cores completed. Several of the samples had little or no recovery in the top portions of the cores. The presence of NAPL, and the potential connection with the upland area, should be further investigated.

3.6 ELUTRIATE SAMPLES / WATER QUALITY MODELING

As part of the characterization of the dredge prism, NW Natural collected four samples (two stations at two depths) of tar material for elutriate analysis using the U.S. Army Corps of Engineers Dredging Elutriate Test (DRET). The elutriate water samples were analyzed for SVOCs, VOCs, petroleum hydrocarbons, and metals. The DRET method is intended as a bench scale simulation of conditions that might be present in the water column close to the dredge. The results of the DRET analysis is included on Table 3 in Appendix D.

The DRET analysis indicated that acute criteria were exceeded for both benzo(a)pyrene and benzo(a)anthracene in all samples collected. The concentrations of benzo(a)pyrene ranged from 0.55 µg/L to 24 µg/L. The concentration of benzo(a)anthracene ranged from 0.76 µg/L to 19 µg/L. The highest concentrations were observed from samples collected from the tar body at 9 to 11 feet below mud line. Although the concentrations were significantly elevated, the DRET analysis is expected to simulate concentrations within a few feet of the dredge and not be representative of concentrations expected downstream. The placement of the containment structure for both the inner and outer removal areas should reduce the concentrations even further for samples collected at the compliance point (150 feet away from the dredge).

Based on the sample results, the EPA requested that NW Natural provide an evaluation of expected contaminant concentrations downstream of the dredge area. The results of the DRET analysis were used in the Kuo-Hayes (1991) model to simulate the expected concentrations in downstream locations. Details of the model runs are presented in the RAPP and in Appendix F of the EE/CA. It is important to note that NW Natural modeled the results assuming that no environmental controls would be in place (i.e. no containment system).

The simulation results (included on Table E-3 in Appendix D) indicated that the 50th percentile for all distances (50 feet, 100 feet, 200 feet, 300 feet, and 400 feet) for all chemical constituents would be below their respective acute criteria. When the 95th percentile were reviewed, only benzo(a)pyrene indicated some exceedances (up to 3.52 times the acute criteria at 50 feet from the dredge). Because of the assumptions included in the model (i.e. no containment system), the model was thought to be an overly conservative estimate of downstream impacts.

Based on actual site data, the 95% UCL of benzo(a)pyrene concentrations 150 feet from the dredge during the 1st week of the project was approximately 4 µg/L, more than 16 times the acute criteria. During the next month, the 95% UCL for benzo(a)pyrene was approximately 2 µg/L, more than 8 times the acute criteria. When the lack of environmental controls assumed in the model are taken into account, it is apparent that the Kuo-Hayes model did a poor job of predicting concentrations of contaminants away from the dredge. While it is beyond the scope of this report, it may be interesting to use the actual concentrations detected at the site to evaluate the sensitivity of different input parameters in the Kuo-Hayes model.

It is interesting to note that the DRET analysis did a better job of predicting the downstream concentrations. The DRET analysis is intended to mimic the concentrations very close to the dredge (within a few feet). However, the DRET concentrations are within the same range as actually observed 150 feet downstream. Part of this may be the fact that the silt curtain, specifically in the case of the inner area full-length silt curtain, appears to have acted as a

retention area in which high concentrations of contaminants built up over a period of time due to constant dredging and disturbance of the tar body. This high build up may have exacerbated the downstream impacts due to constant and consistent leaching of contaminants from the silt curtains. When the partial length curtains were used, the downstream concentrations were significantly lower, likely due to contaminant dispersion and dilution. It is possible, that in the absence of any containment, dispersion and dilution would allow downstream concentrations to be more consistent with the Kuo-Hayes model.

The lack of model and field correlation may be due to the presence of NAPL, insufficient number or representativeness of DRET samples collected, and/or deficiency in the Kuo-Hayes model to incorporate high concentrations of contaminants. Calibrating the model with actual field data may be appropriate for future actions. In addition, alternative models should be explored and evaluated for applicability. It should be noted that pilot tests are likely to be more reliable than modeled data.

3.7 IMPACTS TO FISH

On three occasions during the dredging process, dead and/or distressed fish were observed within the primary containment area. As required by the WQC, in each instance dredging was ceased immediately and the appropriate regulatory agencies notified. Dredging was reactivated upon approval obtained from NMFS and the EPA (see the RACR for details). No distressed fish or dead fish were observed outside the containment area during the removal action.

Fish seining was performed within the inner containment area prior to initiating the removal action. Approximately 175 fish were removed from the inner containment area. There is potential that the dead fish observed during the removal action could have escaped capture during the seining process, becoming trapped inside the silt curtain, as opposed to entering the dredge area subsequent to placement of the containment structures. This appears to have been verified by a diver survey of the inner containment structure immediately following the first observed fish kill, which did not indicate any curtain tears. However, other means by which fish may have entered the containment area include jumping over the silt curtain or passing through openings such as the contractor gate, unseen tears, or billowing of the curtain.

The first instance of fish kill occurred in the morning on the fifth day of dredging September 13, 2005. The dredge operator spotted a dead adult Coho salmon on the shore within the containment area. The fish was still fresh, and based on observations by EPA personnel, it was concluded that the fish had died within the last 24 hours. No other dead and/or distressed fish were observed that day. EPA directed the contractor to use a fish finder in an attempt at locating and possibly retrieving any additional fish. No additional fish were found within the containment area using the fish finder.

The second instance occurred the following day, September 14, 2005, when a total of 3 distressed juvenile fish were retrieved from within the containment area. Fish retrieved included a 4.5-inch bluegill, a 6-inch sunfish and a 7-inch crappie. Attempts at reviving the fish were unsuccessful and the fish were placed on ice for storage.

The third instance occurred on September 29, 2005, when a total of 8 distressed and/or dead juvenile fish were retrieved from the within the containment area. All fish were less than 2 to 3 inches in length and appeared to be juvenile sunfish, with one crappie.

Per the Biological Opinion issued by NMFS, it was anticipated that up to 50 juvenile and 5 adult threatened or endangered (TE) fish would be killed by the dredging process. One adult

TE fish (the Coho) was retrieved from within the containment area. The remaining were adult or juvenile non-TE fish. No dead and/or distressed fish were observed in the outer containment area or the river adjacent to the removal action.

The observed impacts to fish are consistent with the Biological Opinion. A total of 175 fish had been removed from the site through seining prior to the removal action. Considering that 12 dead fish (some very small) were discovered during the project, the ratio of fish removed to those potentially missed suggests that the seining was a very effective means of removing fish within the containment area, specifically considering that depths of greater than 20 feet were located in the removal areas.

Based on visual observations, the combination of the bubble curtain and silt curtains appeared to be effective at preventing fish from entering the containment area. Parametrix field personnel notes indicate that fish were regularly observed jumping out of the river in all areas of the river, but none were seen within the containment area throughout the removal action. Based on the duration of the project and the low number of fish discovered in the removal action area, the bubble curtain and silt curtains appears to have been effective at discouraging fish from entering the contained area. The actual contribution of the bubble curtain, as opposed to the silt curtain, is unknown.

3.8 ANALYTICAL DATA TURN-AROUND TIME

As directed by the EPA, the RAPP included a requirement for laboratory turnaround time (TAT) of 72-hours for all water quality chemical analysis. This requirement was implemented in order to assist in evaluating whether the containment system was operating as intended. Table 3 shows the days in which the EPA received the results of the water quality sampling. The average time in which analytical results were received by EPA was approximately 10 days. As shown, the 72-hour TAT was routinely not met throughout the project and, in fact, the reporting time to EPA increased in the later stages of the project.

There has been a lot of focus by the EPA project team and others regarding the failure of analytical data to be received in the required timeframe. While the requirements were generally not met by NW Natural, the actual impact on the project should be considered. The failures to meet the 72-hour TAT should also be evaluated to determine what actions should be taken in future projects.

A review of the laboratory data sheets, discussions with the project laboratory and representatives of the EPA Manchester Environmental Laboratory, and discussions with Anchor field personnel, indicated that the failure to meet the 72-hour TAT was due to a combination of factors, including:

- Increase in the number of water quality samples from 3 stations to up to 13 stations;
- Occasional delays in delivering the samples to the laboratory, some of which were exacerbated by collection of samples on Friday or Saturday, which could not be delivered until Monday;
- Very low detection limits required, specifically for SVOCs. The low detection limits require a relatively long extraction process to achieve appropriate QA/QC;
- High initial concentrations of SVOCs, which required one or more dilutions by the laboratory to achieve the proper QA/QC;

- Failure by the laboratory to prioritize the samples. On numerous occasions, the laboratory did not analyze the samples for several days and up to one week after receipt of the samples;
- Failure by NW Natural to request that the laboratory reserve or dedicate laboratory equipment or personnel to the project; and
- An on-site laboratory was not utilized for the project, the availability of which may have resulted in shorter TAT.

Because of the failures to receive laboratory results in a timely manner, the EPA project team had difficulty in assessing the effectiveness of the containment system, specifically within the first weeks of the project. When the laboratory results were received and indicated water quality criteria exceedances, EPA responded by requiring all available BMPs to be implemented (which was completed by September 19, 2005, approximately two weeks into the dredging project). After the BMPs were implemented, timely laboratory results would have been helpful in further evaluating the effectiveness of the BMPs on water quality.

As part of the project review, the following items were identified that may help in reducing laboratory TAT and reporting results to EPA in future projects:

- Treat the laboratory as part of the project team, including discussions on the volume of samples to be expected, as well as a contingency plan if the volume of samples increase throughout the project;
- Require the establishment of alternative laboratories, which can be utilized if TAT can not be met by the contract laboratory or to help assist with a larger volume of samples;
- Set up field screening procedures to identify samples which may contain high concentrations of contaminants and notify the laboratory which samples may be required to be diluted;
- Require same-day (12-hour) delivery of samples to the laboratory. This can be established in the Water Quality Certification;
- Require the laboratory to provide dedicated equipment and personnel to the specific project;
- Discuss laboratory procedures in detail with the laboratory chemists (not office/project manager) to gain an understanding of realistic TAT and potential issues which could delay results;
- Require the laboratory to prioritize the samples (which may increase laboratory costs);
- If possible, require preliminary reporting from the laboratory in order to make general field decisions;
- Require the Water Quality Certification to include immediate reporting of results to the EPA project team;
- Explore the potential for utilizing an on-site laboratory. For extended projects, the financial costs of on-site laboratories may be comparable to off-site laboratories.

3.9 BMPS

This section discusses best management practices (BMPs) utilized during the removal action.

3.9.1 Dredge BMPs

In response to the fish kills and exceedances in acute water quality criteria, dredging activities were modified to incorporate all the BMPs specified in the RAPP (Anchor 2005b) and in the Biological Opinion (NMFS 2005), including some in-field modifications to material handling.

The RAPP specified BMPs to be employed from the onset of the project and included:

- No multiple dredge bucket "bites" (standard control);
- No bottom stockpiling (standard control);
- No dragging of the dredge bucket (project specific control);
- No lateral movement of the dredge bucket under water (project specific control);
- Pausing before opening silt curtain access gate (project specific control);
- Spill aprons (project specific control);
- Reduce or stop dredging during peak currents (project specific control); and
- No dredging during night time hours (project specific control).

Subsequent to the observed water quality criteria exceedances and fish kills, BMPs were modified to include:

- Increased dredge bucket cycle time;
- Maximize lateral movement of a full bucket under water in order to minimize the fall of water draining from the bucket into the river;
- Increase the rate of movement of dredge bucket from water to transfer barge to control amount of spillage to the river;
- Reduce over-filling of the dredge bucket; and
- Installation of a barge water treatment system to treat water from being disposed of into the contained area.

The implementation of the additional BMPs and incorporating the barge water treatment system resulted in a substantial reduction in the detected concentrations of contaminants. As shown on Figures 7 and 8, the 95% UCL of detected concentrations of benzo(a)pyrene and benzo(a)anthracene were reduced by more than 50%. However, the concentrations of benzo(a)pyrene and benzo(a)anthracene generally remained above the acute criteria established in the WQC. It wasn't until dredging was initiated in the outer removal area that detected concentrations of benzo(a)pyrene and benzo(a)anthracene were below the acute criteria.

The additional BMPs utilized at the GASCO site should be considered during future removal action projects. For projects of similar contamination characteristics, additional BMPs may be necessary to achieve the low acute criteria expectations.

3.9.2 Barge De-water Treatment System

In response to exceedances in water quality criteria outside the containment area and the occurrence of dead fish discovered within the inner containment area, the EPA directed NW Natural to install a treatment system for treating the water collected on the barge prior to discharge into the river. The treatment system consisted of a preliminary solids filtering

mechanism (screened buckets), followed by an oil/water separator, a secondary solids filter (bag filters), and an activated carbon vessel. The treatment system was on-line by September 19, 2005 and was operational until October 19, 2005, the last day of dredging. The system initially consisted of one carbon vessel, but was later modified to incorporate two carbon vessels in series. The second polishing carbon unit was on-line by October 4, 2005.

In order to monitor the effectiveness of the treatment system, the EPA requested influent and effluent samples be collected from the system on each day the system was used. The influent and effluent samples were analyzed for the same list of analytes as river water quality samples (i.e. SVOCs and cyanide). The full set of results of the influent and effluent samples are included in the RACR. For this analysis, Table 4 shows the benzo(a)anthracene and benzo(a)pyrene results.

As shown in Table 4, the treatment system was effective at reducing the concentrations of benzo(a)anthracene and benzo(a)pyrene. With the exception of 3 days, the treatment system achieved an average percent reduction of 76.7% for benzo(a)anthracene and 69.7% for benzo(a)pyrene. However, the concentrations of these compounds in the effluent remained in excess of their respective acute and chronic water quality criteria. Nonetheless, the treatment system had a positive impact on the nature of the barge water being discharged to the river and helped reduce the concentrations of chemicals being introduced to the water column. The reason for the higher concentrations in the effluent for those 3 days is unknown. However, it may be related to silting of the carbon units and the infrequency in which carbon units were changed out. Due to the delay in water sample results, NW Natural could not anticipate the need for carbon changeout. A monitoring program and evaluation of treatment efficiency should be implemented for all treatment systems incorporated in the removal action. In addition, a regular operation and maintenance plan should be developed and implemented.

3.10 SEDIMENT TRAP AND SEDIMENT STAKE MONITORING

The EPA required the use of sediment traps to be deployed at the site to measure potential dispersion of suspended sediment downstream. Three sediment traps were deployed at the site, one to measure upstream (background) conditions and two downstream at approximately 150 feet and 750 feet from of the outer containment area. In addition, the EPA required the placement of sediment stakes within the outer containment area to further evaluate the potential for deposition of contaminants in the containment area.

Baseline sampling for the sediment traps was completed for approximately 35 days prior to the removal action to provide a comparison of data. The sediment traps were re-deployed prior to the removal action for a period of 82 days. Tables 28 and 29 of the RACR (included as supporting information in Appendix D) include the sediment trap data.

In general, the mass of accumulated sediment was highly variable. In two of the three stations, the mass of sediment collected in the traps was higher in the baseline sampling, even though the duration was approximately half of the post-construction samples. This is likely due to the varying river conditions regarding flow and depositional areas. The placement of the silt curtain containment system, as well as supporting barges and equipment, likely impacted the natural flow regime in the area and may have impacted deposition of suspended sediment.

Because of the low number of sediment traps used and the potential impact of the removal action equipment on the flow regime, a comparison to the baseline conditions is difficult. However, as shown on Table 29, there is an approximately one order of magnitude increase in the detected concentrations of SVOCs in the sediment collected in the post-construction samples. This increase is likely directly attributable to the removal action.

Sediment stakes were not able to be retrieved after the removal action was complete. NW Natural indicated that the sediment stakes were likely removed by derrick barge spuds during times when the derrick needed to provide access to monitoring personnel. Because no evaluation of the sediment stake accumulation was possible, EPA directed NW Natural to extend the fringe cover to the upstream extent of the outer removal area.

As directed by EPA, NW Natural attempted to evaluate the potential mass of tPAHs deposited downstream using the sediment trap data. The evaluation included in the RACR includes hydrological considerations, a comparison of SVOC concentrations in baseline and post-construction samples, and an estimate of deposition mass.

Due to the low number of sediment traps utilized (three) and the data variability, the estimate for the loss of mass downstream is difficult to quantify. The method employed in the RACR appears to be adequate for providing general estimates of the deposition of contaminants downstream. However, the analysis used a variety of assumptions to arrive at the estimates. It is clear that additional sediment trap information is critical for proper assessment of mass loss during a dredging removal action.

Because the GASCO project was one of the first early actions, the use of sediment trap information was limited (i.e. negotiations between NW Natural and EPA resulted in a limited data set). However, sediment trap deployment appears to be a viable and important method in which to evaluate downstream impacts. The costs for deployment of sediment traps and sample analysis are generally not large, considering the total costs of most removal actions. Future dredging projects should consider the use of sediment traps for evaluating the potential loss of contaminants downstream. However, because of the highly variable nature of the river system and the potential impacts of in-water work to affect natural scour and depositional areas, a relatively large system of sediment traps needs to be deployed to be an effective measurement tool. In addition, baseline conditions should be established over a relatively long period of time to account for seasonal fluctuations, as well as the impact of tidal fluctuations (reverse flow conditions were observed a number of times at GASCO during the removal action).

3.11 SEDIMENT OFFLOADING AREA

As part of the transportation and disposal plan (TDP) in the RAPP, samples were collected at the offloading facility in Boardman, Oregon to evaluate tracking of materials offsite. Soil samples were collected in two locations, one at the exit of the load out pad, and one along the shoulder of the public road to the disposal facility (see Figure 15 of the RACR). One set of samples were collected prior to any operations at the site and one set was collected after the facility had been demobilized.

The analytical results are included in Table 9 of the RACR (also in Appendix D). The pre- and post-construction samples near the road did not indicate a significant difference in concentrations of SVOCs. However, the SVOC concentrations in the post-construction samples collected near the load out pad were one to two orders of magnitude higher than the pre-construction samples.

The evaluation in the RACR indicated that the contamination detected in the post-construction samples were unrelated to the project activities. The evaluation included a comparison of the relative percentage of constituents in the transfer facility sample to a sample collected from the visually contaminated material from the dredge prism. According to the analysis presented, the "fingerprint" does not match and, therefore, NW Natural

indicated that the post-construction sample collected from the load out pad is not from the tar material.

While the evaluation presented may have some merit, it does not confirm that the contamination detected at the offloading facility was from another source. The sample from the visually contaminated material in the dredge prism was relatively undisturbed prior to the laboratory analysis (i.e. collected using a core through the tar material). Conversely, the tar material transported to the offloading facility underwent relatively vigorous disturbance from dredging and placement on the barge, mixing with cement for stabilization, several days to a week or more of transport time to the offloading facility, and further handling at the offloading facility. These processes have the ability to change the composition of the material due to volatilization and degradation. There is a potential for contaminant composition of samples obtained from the offloading facility to differ from those collected in the in-water area.

While the contamination detected at the offloading facility could be related to the offloading activities, it is not expected that the contamination is extensive. During inspections of the facility and observation of loading operations, very few spills or releases were noted. Those that were observed, including splashing of the material in the hopper during the first days of operation, Parametrix noted that the contractor was very diligent in collecting the material from the ground surface.

It is expected that over the course of two months of operations at the offloading facility and the high volume of trucks passing through the facility, the contaminants detected in the soil sample at the offloading facility could have been the result of spills or releases from offloading operations. However, based on the lack of observations of direct spills, the diligent cleanup efforts of the contractor, and the time in which has passed since the occurrence (11 months) and continued use of the facility since that time, further evaluation or cleanup of the offloading facility is not warranted.

Future removal actions should consider the importance of collecting baseline and post-construction samples from the offloading facility and/or haul routes to assess potential impacts due to project-specific activities. In addition, all observed or suspected spills or releases should be investigated as soon as possible and appropriate remedial actions implemented.

Baseline and post-construction sampling efforts should include the collection of statistically representative sampling locations and quantity, including composite samples and archived sub-samples to identify potential contaminant areas.

4. CONCLUSIONS AND RECOMMENDATIONS

Parametrix provided construction oversight of the GASCO early removal action. Based on observations made during oversight of the removal action and a review of site data, project documents, and other information, Parametrix provides the following conclusions and recommendations:

1. Approximately 15,300 cubic yards of tar and tar-contaminated sediment was removed during the early removal action and disposed at a Subtitle C landfill. A pilot cap was placed over the dredged area to limit future releases of contaminants and to evaluate the applicability of sediment capping technology in future removal/remedial actions at the GASCO site. The early removal action appears to have provided substantial benefit to human health and the environment by removing pure tar material and the highest concentrations of total polynuclear aromatic hydrocarbons (tPAHs) at the site. The long-term benefits, which include limiting the potential for direct exposure to contaminated material by aquatic organisms, reducing continual releases of dissolved contaminants from the tar body to the overlying water column, and limiting the potential for scour and deposition of contaminated sediment downstream, appear to outweigh the short-term impacts of the removal action. Short-term impacts include periodic exceedances of water quality criteria outside of the containment area, a limited amount of dead fish within the containment area, and the potential to have released a limited amount of contaminant mass away from the dredged area.

2. The GASCO early action provided an opportunity to the EPA project team to evaluate a number of issues raised during the project to help facilitate other remedial actions at the GASCO site or removal actions in the greater Portland Harbor Superfund Site. Since the GASCO removal action was one of the first early actions completed in the Portland Harbor, the EPA project team can use the experience gained at GASCO to provide a greater understanding of expected project concerns for dredging projects. The lessons learned from GASCO removal action should be considered in future removal actions in the Portland Harbor.

3. EPA required a relatively robust chemical monitoring program and implementation of chemical water quality criteria in the Water Quality Certification. Traditional sampling programs generally consist of field measurements, including turbidity, temperature, dissolved oxygen, and visual indicators, to assess water column impacts from dredging. The exceedances of water quality criteria during the GASCO project resulted in a number of criticisms to NW Natural and EPA from the public, environmental groups, and other entities. Based on the data collected, it is clear that the traditional field measurements would not have resulted in the perceived problems with the project. However, the criticism from the public should not discourage EPA from requiring chemical water monitoring programs. In fact, the experience at GASCO should be used to justify additional chemical sampling in order to ensure that actual impacts to water quality are being properly assessed during early actions. The sampling program required by EPA was appropriate and effective in demonstrating the impacts to water quality from the removal action.

4. Future projects which include a chemical water quality program should include an extensive background evaluation for water quality and should be considered when establishing water quality criteria in a Water Quality Certification or other regulatory document. As observed with the GASCO project, there is potential that ambient conditions may exceed water quality criteria and may impact the ability to meet

project-specific criteria. Additional background sampling would have been beneficial to evaluate the variability of ambient conditions, specifically representing various weather conditions, wave action, river flow, and upstream impacts/activities.

5. The full-length silt curtain utilized during dredging activities within the inner removal area appears to have been somewhat effective at reducing concentrations of contaminants from entering the river channel. However, the full-length silt curtain was not effective at reducing the concentrations outside the containment area to below the acute criteria established in the Water Quality Certification. For removal actions of similar contaminants and scope, additional containment technologies may be required to meet acute water quality criteria standards. Based primarily on visual observations, the full-length silt curtain appears to have contained suspended particles better than the partial length silt curtain, although no data exists to support this conclusion.

6. The partial length silt curtain utilized during dredging within the outer removal area also had some impact on water quality. Significantly lower concentrations of contaminants were observed during the outer removal operations. However, based on the data reviewed and visual indications, it appears that a significant portion of the lower concentrations detected may be attributed to the apparent flow between the partial length silt curtain and the offset bedload baffle. This gap in containment likely provided a preferential pathway for flow to occur between the contained area and the river. The lower concentrations observed downstream is likely due to dispersion and dilution of contaminants. Though water quality samples were better with the partial-length silt curtain, it appears that more contaminated particles were lost using the partial-length silt curtain than the full-length silt curtains. However, there is not sufficient data to differentiate the mass loss between the two containment systems.

7. The implementation of additional best management practices, including operational changes for dredging and material handling and installation of a barge water treatment system, resulted in an approximately 50% reduction of detected concentrations of contaminants outside the containment area.

8. Chemical water quality criteria exceedances were the primary factor in which EPA directed additional best management practices during the removal action. Other than a few minor exceedances, turbidity was not a driving factor for triggering response actions at the site. Similarly, dissolved oxygen, pH, temperature and conductivity criteria were not exceeded.

9. Although visual observations indicated that the bubble curtain may have contributed to elevated turbidity measurements, a review of the field measurement data does not support this conclusion. This may be due to the periodic nature of field sampling or the heterogeneity of the river bottom near the bubble curtain. The data indicates that turbidity was not significantly less after the bubble curtain was shut down. The most significant impact on turbidity appears to have resulted from the change from the inner removal area to the outer removal area, which resulted in greater connection of flow between the river and the contained area.

10. It is not known whether the use of sheet pile walls would have resulted in less short-term impacts to the river than the silt curtain system. While likely controlling water quality exceedances during the dredging due to superior containment, there is potential that installation and removal of the sheet pile walls would have resulted in substantial releases. As observed throughout the GASCO project, several areas of the tar body exhibited highly mobile features and released substantial sheen at even the

slightest disturbance. Further analysis would be required to fully understand the potential for water quality issues and sediment resuspension during sheet pile installation and removal. However, sheet pile containment may be a viable option for future projects, specifically for longer-term projects where the financial and logistical issues may be lessened.

11. The hydraulic dredging alternative was not considered sufficiently by NW Natural, which cited concerns with the physical condition of the tar body and other issues. It is recommended that hydraulic dredging should be considered with any future dredging projects at GASCO or other Portland Harbor sites. The significant advantages of hydraulic dredging to control potential water quality impacts may outweigh disadvantages due to financial or logistical concerns. In addition, the use of hydraulic dredging may significantly reduce the necessity of containment structures. Future dredging projects should re-evaluate this alternative, including the use of pilot tests or other means to more fully evaluate the alternative.

12. It is not known if the non-aqueous phase liquids (NAPL) observed along the shoreline cut of the removal action area is present further into the river sediment. A relatively large area of NAPL has been documented in the upland portion of the GASCO site, but has not been directly linked to in-water areas, primarily due to lack of sufficient data. The lack of observed NAPL during the tar body characterization may be associated with the sampling method or the relatively limited cores completed. The presence of NAPL, and the potential connection with the upland area should be further investigated.

13. The water quality modeling using the Kuo-Hayes model did a poor job of predicting concentrations of contaminants away from the dredge. The actual concentrations detected outside the containment area were substantially higher than those predicted, even though the model assumed that no containment would be placed. The lack of model and field correlation may be due to the presence of NAPL, insufficient number or representativeness of dredge elutriate test (DRET) samples collected, and/or deficiency in the Kuo-Hayes model to incorporate high concentrations of contaminants. Calibrating the model with actual field data may be appropriate for future actions. However, alternative models should be explored and evaluated for applicability. Based on a preliminary review, no calibrated and accepted water quality models have been identified which incorporate dredging operations with a containment component. It should be noted that pilot tests are likely to be more reliable than modeled data.

14. A total of 12 dead fish were retrieved from the primary containment area during the removal action, including one adult Coho salmon and eleven adult or juvenile non-threatened and endangered fish. No dead and/or distressed fish were observed within the outer containment area or outside the containment area during the project. The fish take was consistent with that expected in the Biological Opinion. A total of 175 fish had been removed from the site through seining prior to the removal action. Considering that 12 dead fish (some very small) were discovered during the project, the ratio of fish removed to those potentially missed suggests that the seining was a very effective means of removing fish within the containment area, specifically considering that depths of greater than 20 feet were located in the removal areas.

15. The requirement for 72-hour laboratory analytical turnaround time and reporting to EPA was routinely not met during the project. The failure to report laboratory data in a timely manner was due to a combination of issues including, but not limited to, an

increase in the number of samples collected, very low detection limits required, and the lack of project-dedicated laboratory equipment and personnel. Timely laboratory data can be critical to implementing and evaluating best management practices. Future early actions, specifically those with chemical monitoring programs that require laboratory data to make field decisions, should include specific requirements and contingencies to ensure that the agreed-upon reporting is met consistently.

16. Sediment trap information was limited during the project and appears to be inconclusive, but appears to be a viable and important method for estimating downstream impacts of dredging. EPA will consider the use of sediment traps for future removal actions to evaluate the potential loss of contaminants during a removal action. However, because of the highly variable nature of the river system and the potential impacts of in-water work to affect natural scour and depositional areas, a relatively large system of sediment traps should be deployed to be an effective measurement tool. In addition, baseline conditions should be established over a relatively long period of time to account for seasonal fluctuations, as well as the impact of tidal influences.

17. The contaminants detected in a post-construction sample collected at the offloading facility at the Port of Morrow, appears to be related to the GASCO removal action. There is not sufficient data to estimate the area of extent, but based on site observations and known activities, it is expected to be limited. In addition, based on the lack of observations of direct spills, the diligent cleanup efforts of the contractor during the offloading activities, and the time which has passed since the occurrence (11 months) and continued use of the facility by others, further evaluation or cleanup of the offloading facility does not appear to be warranted. Future removal actions should consider the importance of collecting baseline and post-construction samples from offloading facilities and/or haul routes to assess potential impacts from site activities. A statistically representative number of samples should be collected to evaluate the need for and scope of post-construction remedial actions for contaminants tracked off-site or spilled.

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TABLES

Table 1 Concentration of Benzo(a)pyrene Inside and Outside Silt Curtain
GASCO Early Removal Action

Activity	Sample Date	Benzo(a)pyrene Conc. (ug/L)		Efficiency %
		Inside Curtain	Outside Curtain	
Dredging Inner Area	9/27/2005	16.6	0.328	98.0
	9/29/2005	16	0.36	97.8
	9/30/2005	11	0.11	99.0
	10/3/2005	9.9	3.3	66.7
	10/4/2005	4.4	0.62	85.9
	10/6/2005	2.2	1.4	36.4
	Average	**10.0**	**1.0**	**80.6**
Dredging Outer Area	10/11/2005	0.67	0.14	79.1
	10/12/2005	1	0.57	43.0
	10/13/2005	1.3	0.2	84.6
	10/14/2005	0.49	0.22	55.1
	10/15/2005	0.39	0.2	48.7
	10/16/2005	0.1	0.13	-30.0
	10/17/2005	0.13	0.33	-153.8
	10/18/2005	0.81	0.14	82.7
	Average	**0.6**	**0.2**	**26.2**
Capping	10/20/2005	0.31	0.081	73.9
	10/21/2005	0.24	0.35	-45.8
	10/22/2005	0.34	0.26	23.5
	Average	**0.3**	**0.2**	**17.2**

Table 2 Concentrations of Benzo(a)anthracene and Benzo(a)pyrene Detected at 600 feet Downstream Location GASCO Early Removal Action

DATE	Bottom Sample		Middle Sample		Surface Sample	
	benzo(a)anthracene	benzo(a)pyrene	benzo(a)anthracene	benzo(a)pyrene	benzo(a)anthracene	benzo(a)pyrene
10/12/2005	0.56	0.74	0.58	0.86	0.55	0.64
10/13/2005	0.019 UJ	0.019 U	0.12	0.22	0.14	0.23
10/14/2005	0.062	0.14	0.11	0.21	0.049	0.13
10/15/2005	0.05	0.61 J	0.069	0.14	0.13	0.2
10/16/2005	0.39	0.43	0.19	0.21	0.079	0.09
10/17/2005	0.51 J	0.45	0.18 J	0.19	0.074 J	0.02 U
10/18/2005	0.44	0.54	0.22	0.33	0.33	0.47
10/20/2005	0.28 J	0.32 J	0.11 J	0.26 J	0.032 J	0.034 J
10/21/2005	0.15 J	0.19 J	0.15 J	0.18 J	0.069 J	0.089 J
10/22/2005	0.02 UJ	0.027 J	0.02 UJ	0.027 J	0.019 UJ	0.02 J
10/24/2005	0.11 J	0.14 J	0.073 J	0.093 J	0.019 J	0.02 J
10/25/2005	0.099 J	0.11 J	0.12 J	0.15 J	0.052 J	0.044 J
10/27/2005	0.019 UJ	0.019 UJ	0.02 UJ	0.02 UJ	0.019 UJ	0.019 UJ
10/28/2005	0.041	0.043 J	0.02 UJ	0.02 UJ	0.021 UJ	0.021 U
10/29/2005	0.019 UJ	0.019 U	0.019 U	0.019 U	0.068	0.076

Notes:
U - Non-detect
J - Estimated, the result is below the reporting limit and above the laboratory detection limit.

Table 3 Evaluation of Laboratory Data Reporting to EPA GASCO Early Removal Action

Date Sampled	Date Delivered to Lab	Lab Analysis Date[1]	Results Reported to EPA	Elasped Time (Days)
9/7/2005	9/8/2005	9/12/2005	9/14/2005	7
9/8/2005	9/9/2005	9/13/2005	9/14/2005	6
9/9/2005	9/12/2005	9/13/2005	9/15/2005	6
9/12/2005	9/13/2005	9/15/2005	9/16/2005	4
9/13/2005	9/15/2005	9/16/2005	9/19/2005	6
9/16/2005	9/19/2005	9/21/2005	9/22/2005	6
9/19/2005	9/21/2005	9/22/2005	9/23/2005	4
9/20/2005	9/21/2005	9/22/2005	9/23/2005	3
9/21/2005	9/21/2005	9/26/2005	9/27/2005	6
9/23/2005	9/26/2005	9/28/2005	9/28/2005	5
9/26/2005	9/27/2005	9/29/2005	10/4/2005	8
9/27/2005	9/28/2005	9/30/2005	10/4/2005	7
9/29/2005	9/30/2005	10/9/2005	10/11/2005	12
9/30/2005	10/3/2005	10/12/2005	10/13/2005	13
10/3/2005	10/4/2005	10/12/2005	10/17/2005	14
10/4/2005	10/5/2005	10/12/2005	10/17/2005	13
10/5/2005	10/6/2005	10/14/2005	10/17/2005	12
10/6/2005	10/7/2005	10/20/2005	10/21/2005	15
10/7/2005	10/8/2005	10/14/2005	10/21/2005	14
10/10/2005	10/11/2005	10/14/2005	10/21/2005	11
10/11/2005	10/14/2005	10/17/2005	10/26/2005	15
10/12/2005	10/13/2005	10/18/2005	10/26/2005	14
10/13/2005	10/14/2005	10/24/2005	10/26/2005	13
10/14/2005	10/17/2005	10/25/2005	10/28/2005	14
10/15/2005	10/18/2005	10/26/2005	10/28/2005	13
10/16/2005	10/18/2005	10/27/2005	11/1/2005	16
10/17/2005	10/18/2005	10/27/2005	11/1/2005	15
			Average	**10**

Notes:

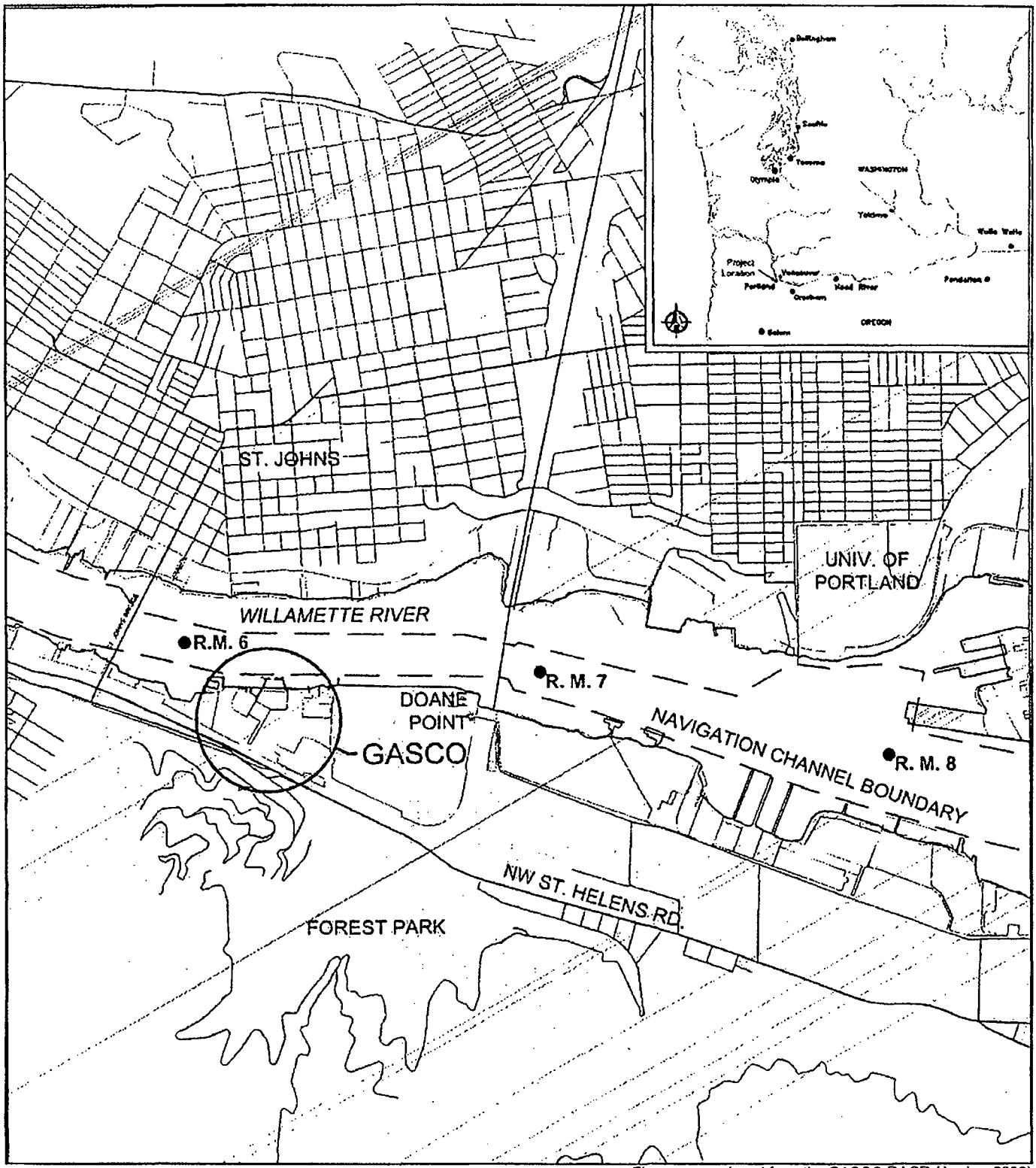
Water Quality Certification requires a 72-hour reporting period by laboratory

[1] Date analyzed by lab may include multiple dates; date selected is latest date for 8270C Method

Table 4 Barge Water Treatment System Analytical Results GASCO Early Removal Action

Date	Concentration (ug/L)					
	Benzo(a)anthracene			Benzo(a)pyrene		
	Influent	Effluent	Percent Reduction	Influent	Effluent	Percent Reduction
9/19/2005	80.6	2.07	97.4%	132	3.47	97.4%
9/20/2005	2540	11.2	99.6%	2970	12.5	99.6%
9/21/2005	1.84	1.88	-2.2%	2.75	2.82	-2.5%
9/23/2005	7.8	6.9	11.5%	10.2	9.26	9.2%
9/26/2005	28.4	16.1	43.3%	80.4	72.7	9.6%
9/27/2005	31.9	12.5	60.8%	87.3	67.9	22.2%
9/28/2005	22	4.7	78.6%	27	5.5	79.6%
9/29/2005	24	2.7	88.8%	36	3.8	89.4%
9/30/2005	0.37	3.7	-900.0%	0.6	6.7	-1016.7%
10/1/2005	12	3.6	70.0%	14	5.9	57.9%
10/3/2005	330	25	92.4%	390	32	91.8%
10/4/2005	58	5.2	91.0%	78	6.1	92.2%
10/5/2005	49	3.7	92.4%	62	5.2	91.6%
10/6/2005	74	49	33.8%	110	70	36.4%
10/7/2005	9.1	76	-735.2%	15	100	-566.7%
10/10/2005	10	2.3	77.0%	20	4.2	79.0%
10/12/2005	31	2.6	91.6%	33	4.3	87.0%
10/13/2005	35	11	68.6%	35	15	57.1%
10/14/2005	73	13	82.2%	84	17	79.8%
10/15/2005	57	1.3	97.7%	61	1.7	97.2%
10/16/2005	210	40	81.0%	230	59	74.3%
10/17/2005	120	42	65.0%	95	60	36.8%
10/18/2005	380	1.7	99.6%	440	2.7	99.4%
10/19/2005	15	1.9	87.3%	14	2.8	80.0%

FIGURES



Parametrix EPA GASCO 415-2328-007/003A(RO00) 7/06 (B)

Figures reproduced from the GASCO RACR (Anchor 2006)

N

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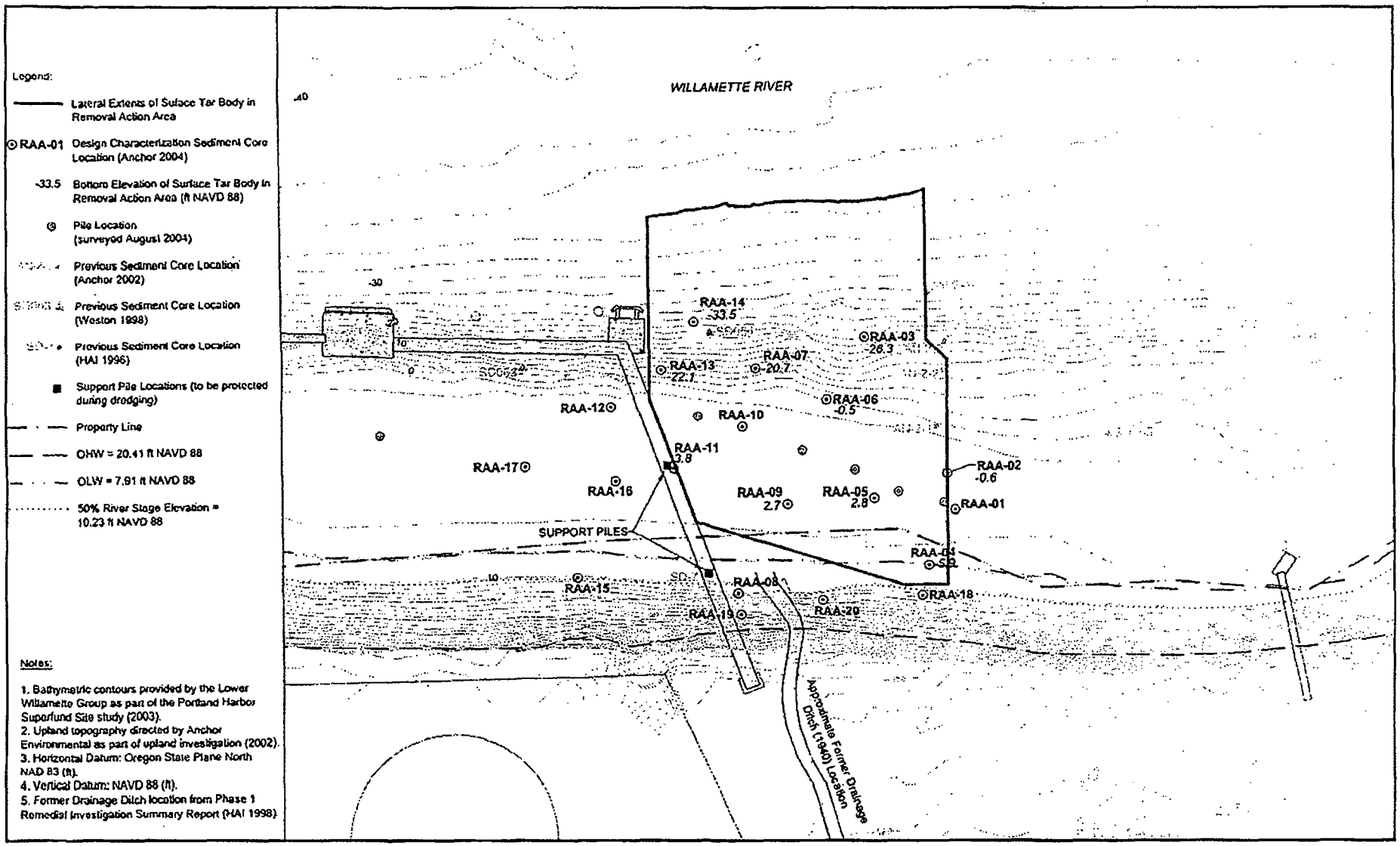
SCALE IN FEET

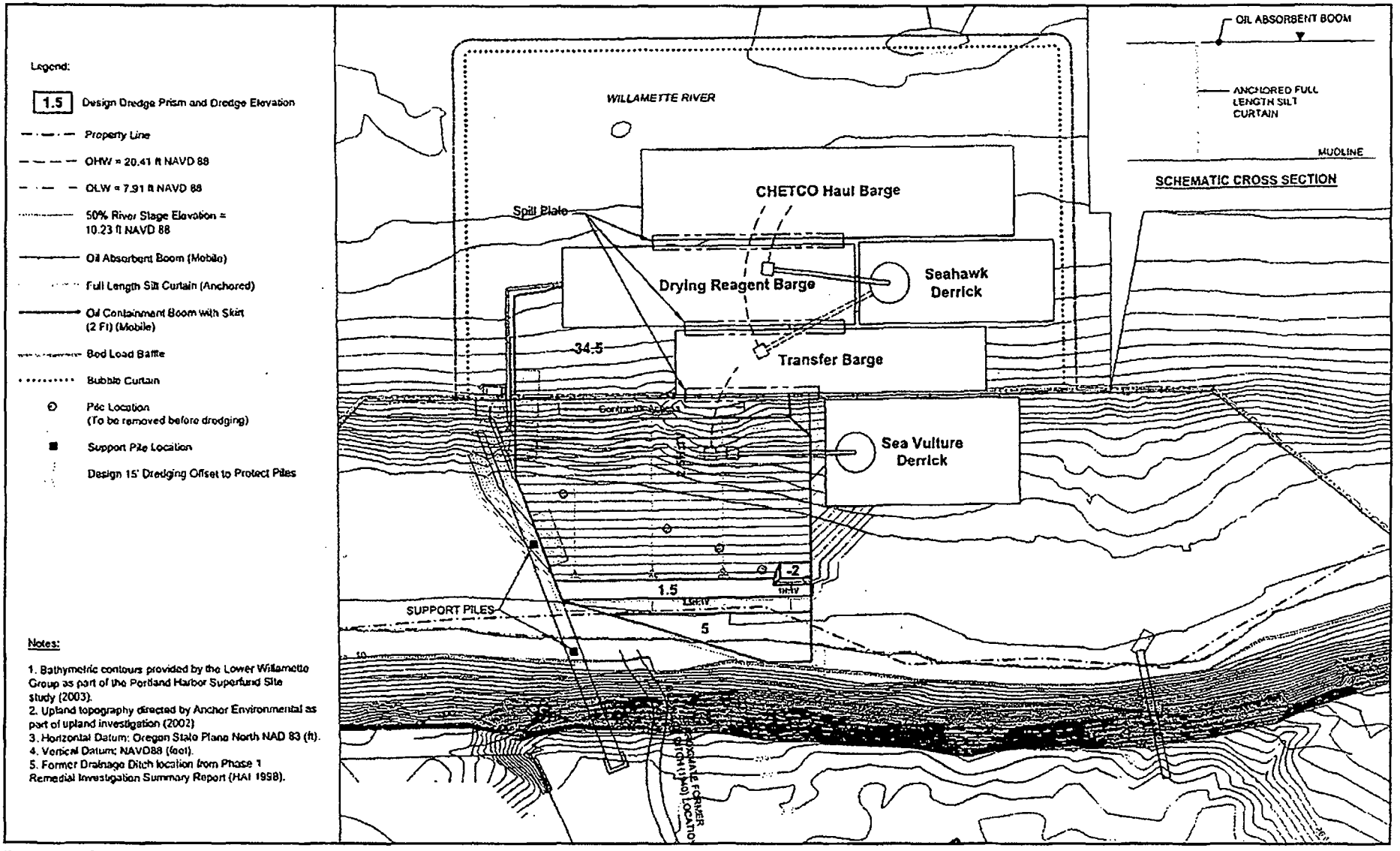
Figure 1
Site Vicinity Map



Parametrix EPA GASCO 415-2328-007/003A(RQ00) 7/06 (B)

Figures reproduced from the GASCO RACR (Anchor 2006)

Figure 2
Site Map and Dredge Prism



Parametrix EPA GASCO 415-2328-007/003A(RQ00) 7/06 (B)

Figures reproduced from the GASCO RACR (Anchor 2006)

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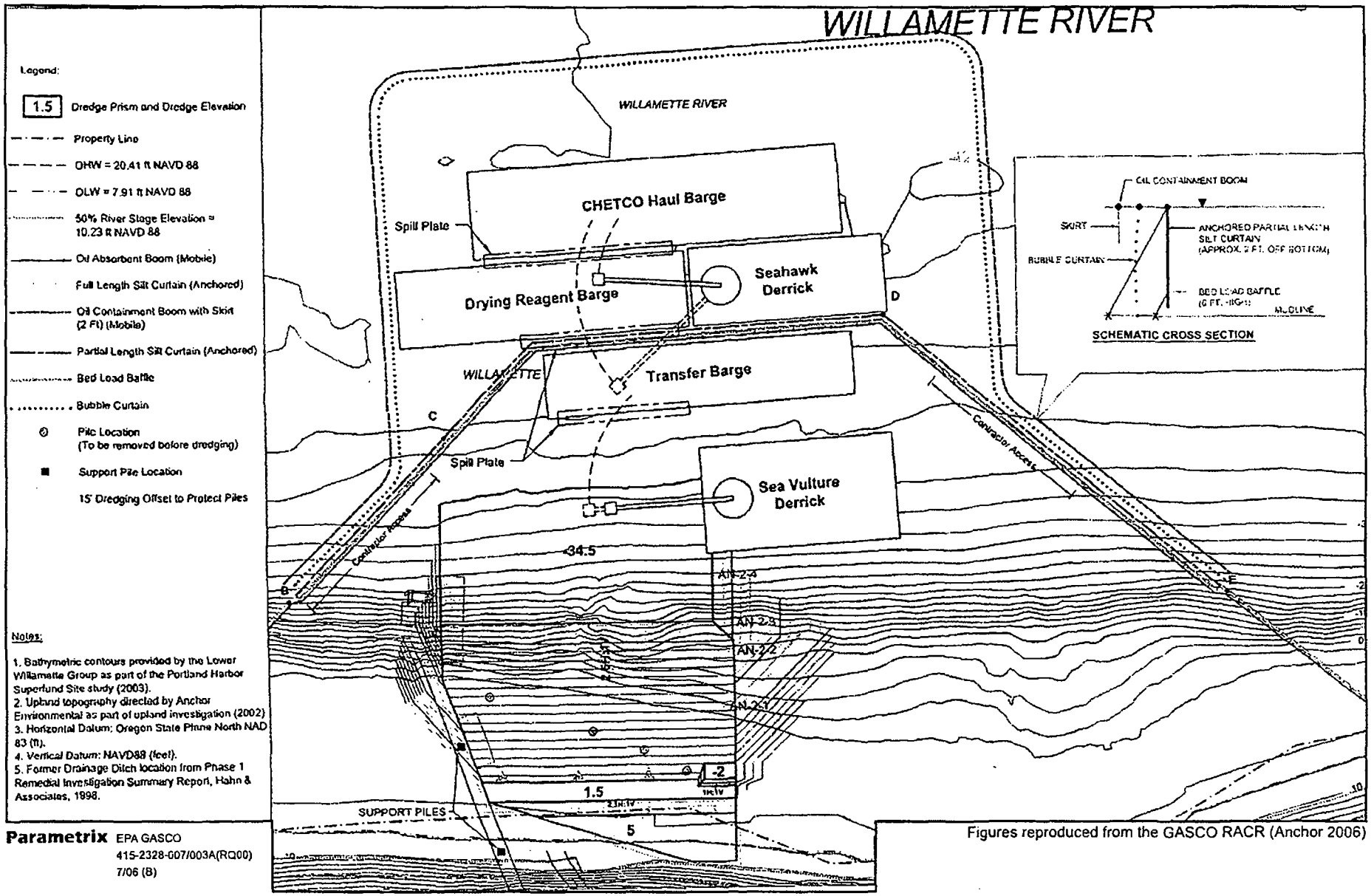
SCALE IN FEET

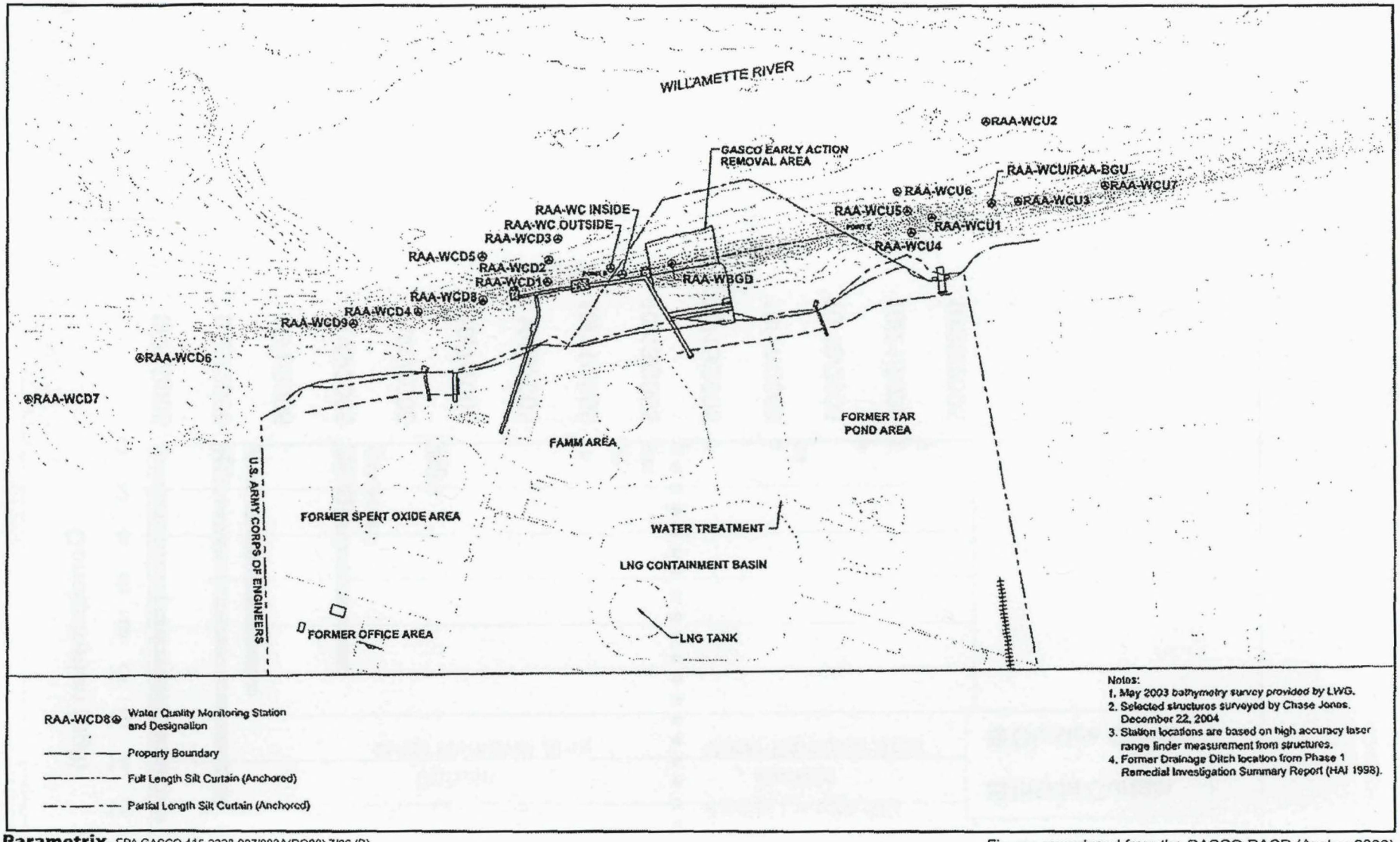
Figure 3
Inner Removal Area Configuration



Parametrix EPA GASCO
415-2328-007/003A(RQ00)
7/06 (B)

Figures reproduced from the GASCO RACR (Anchor 2006)

Figure 4
Outer Removal Area Configuration



Figures reproduced from the GASCO RACR (Anchor 2006)

N

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SCALE IN FEET

Figure 5
Water Quality
Sampling Locations

Figure 6
Gasco Removal Action
Comparison of Benzo(a)pyrene Concentrations Inside and Outside Silt Curtains

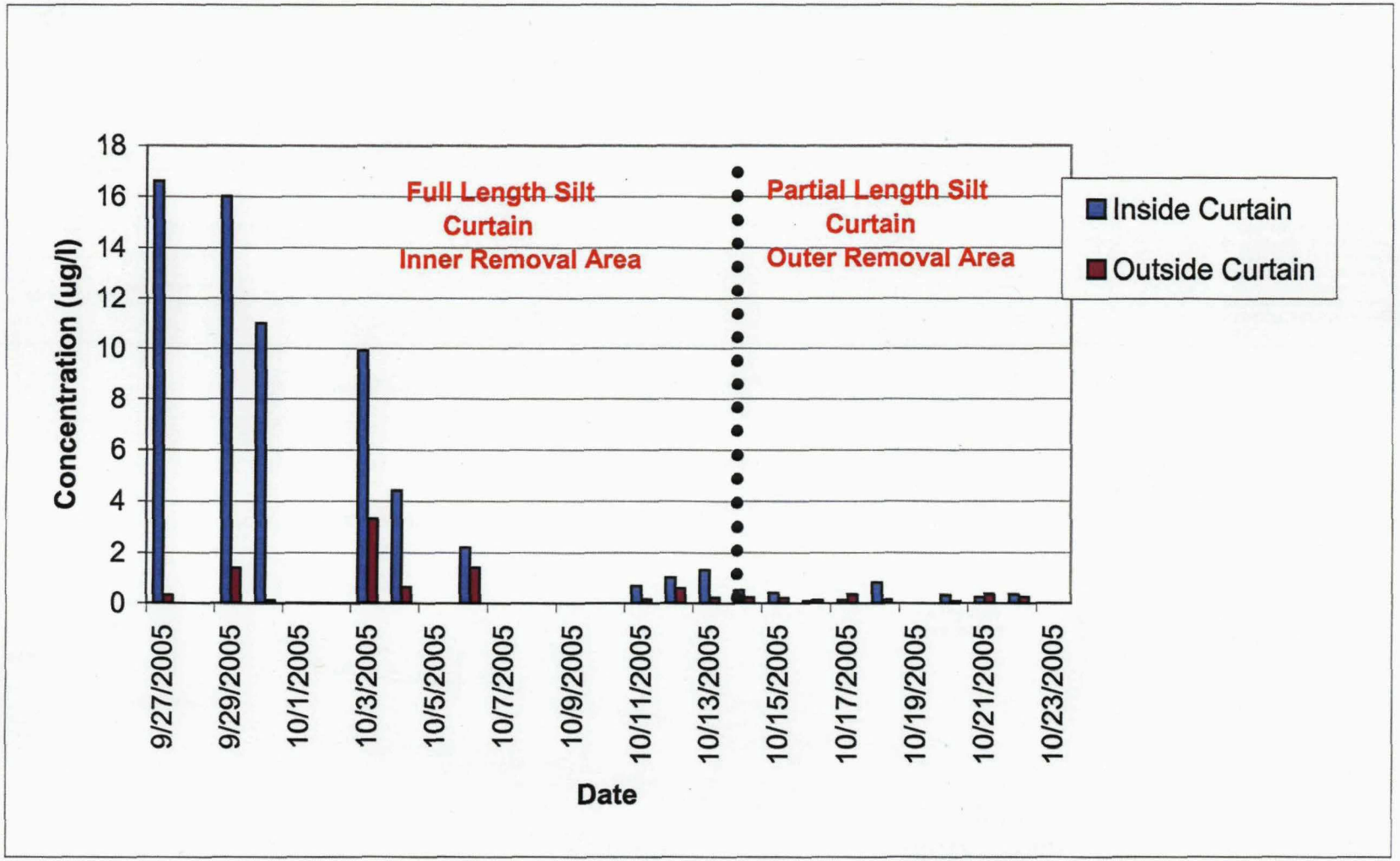


Figure 7
Gasco Removal Action
Concentration Trend of Benzo(a)anthracene
Approximately 150 feet Downstream of Containment

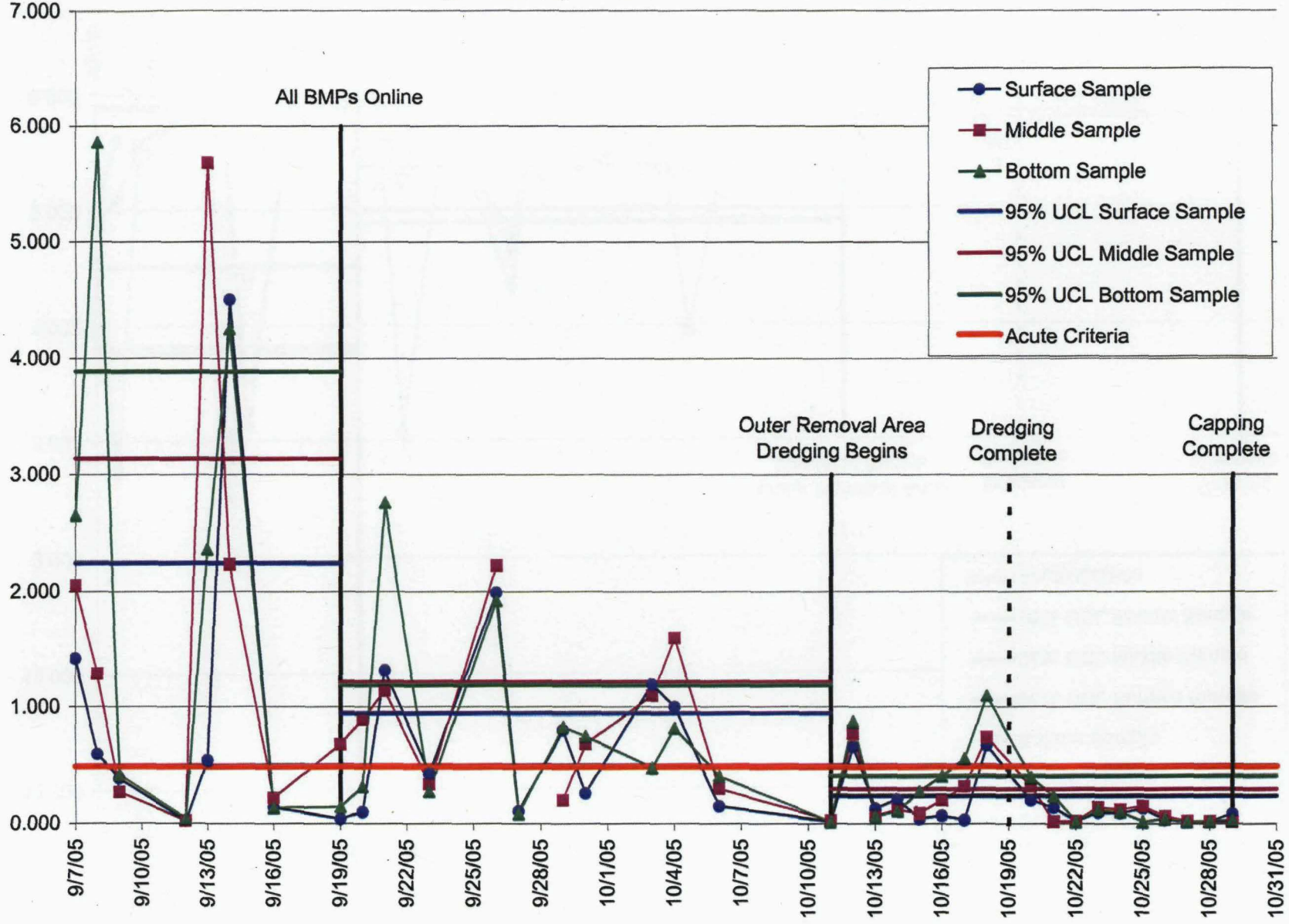


Figure 8
Gasco Removal Action
Concentration Trend of Benzo(a)pyrene
Approximately 150 feet Downstream of Containment

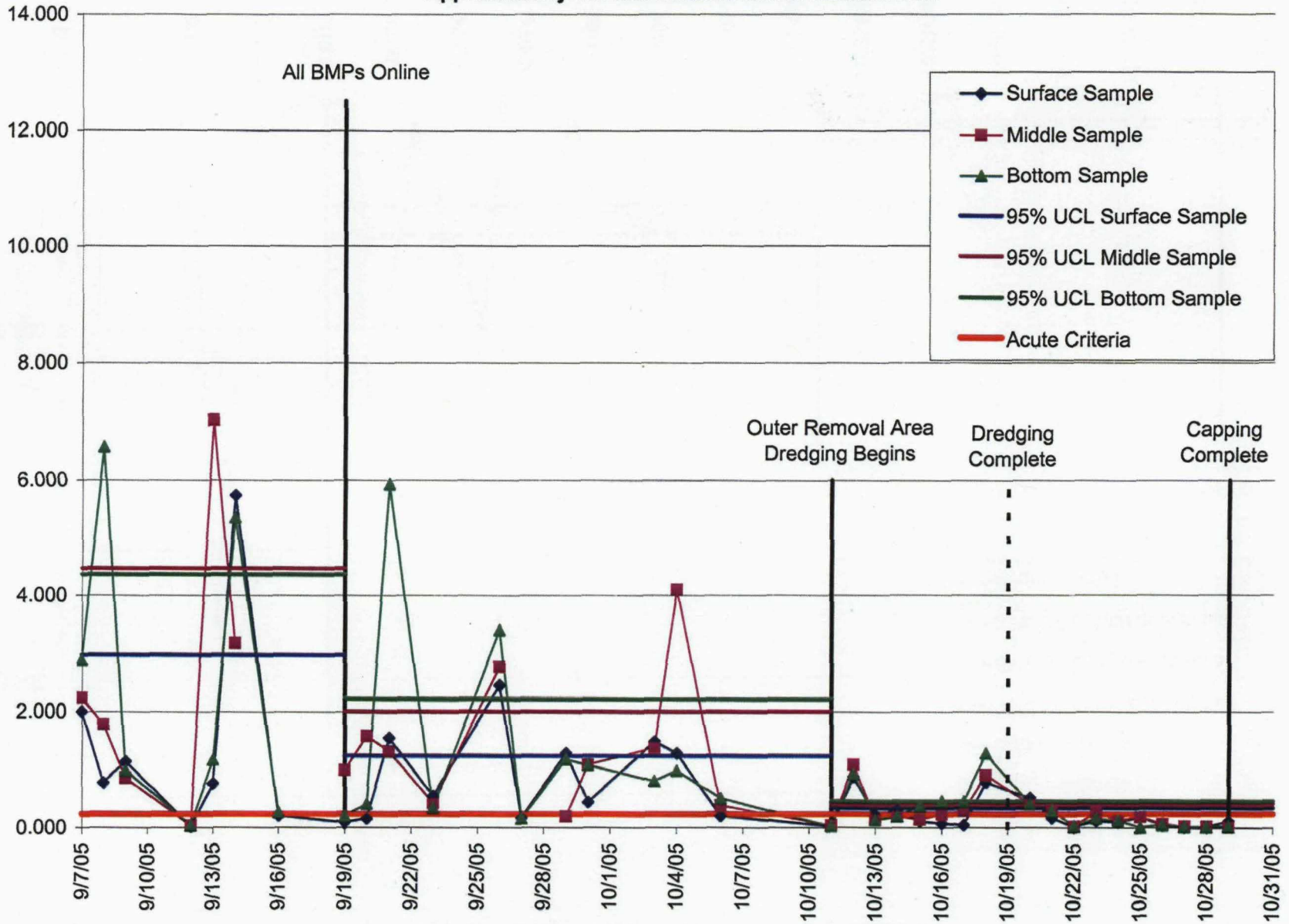


Figure 9
Gasco Removal Action
Daily Maximum Turbidity and Benzo(a)anthracene Concentration Trend
Approximately 150 feet Downstream of Containment

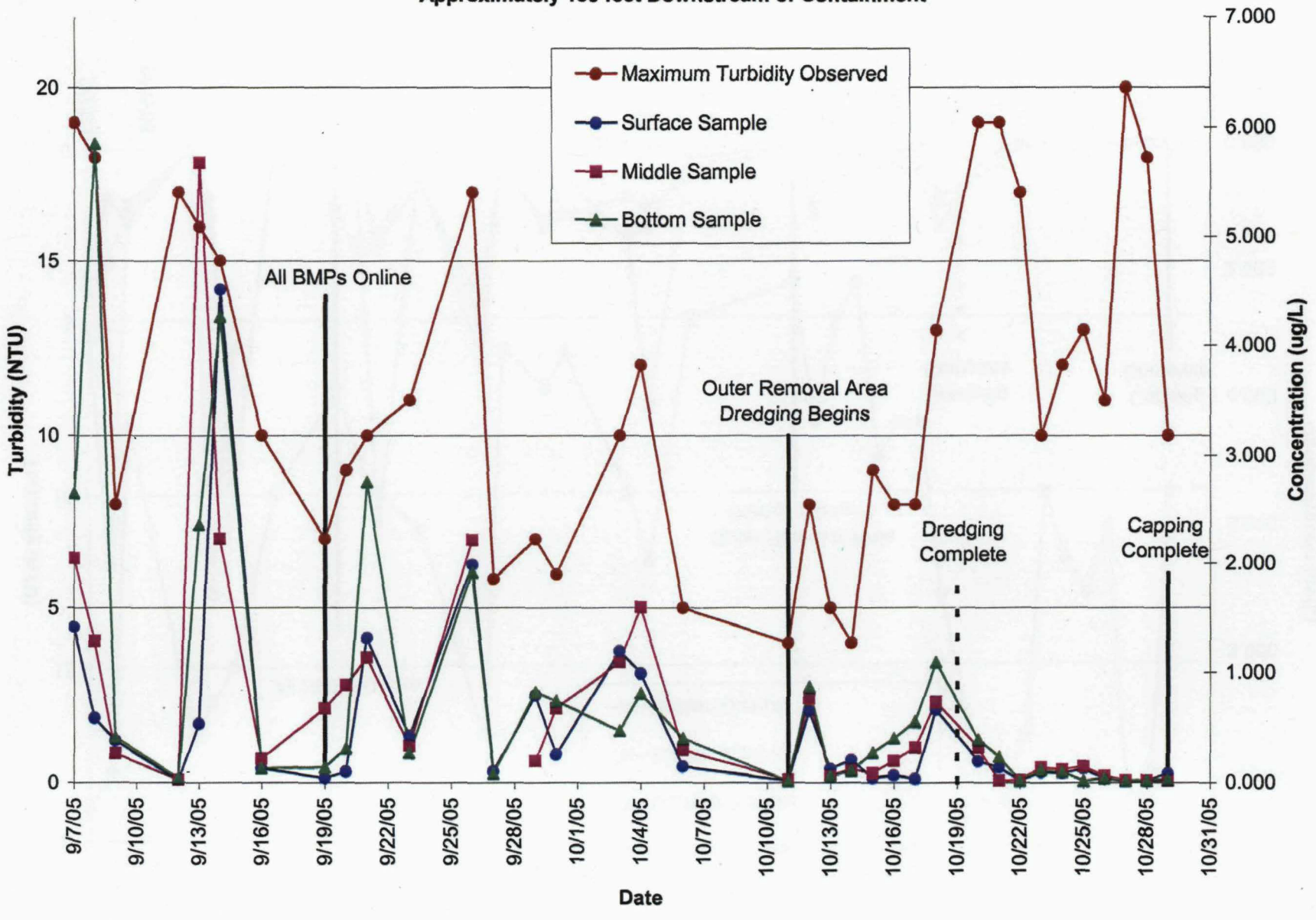
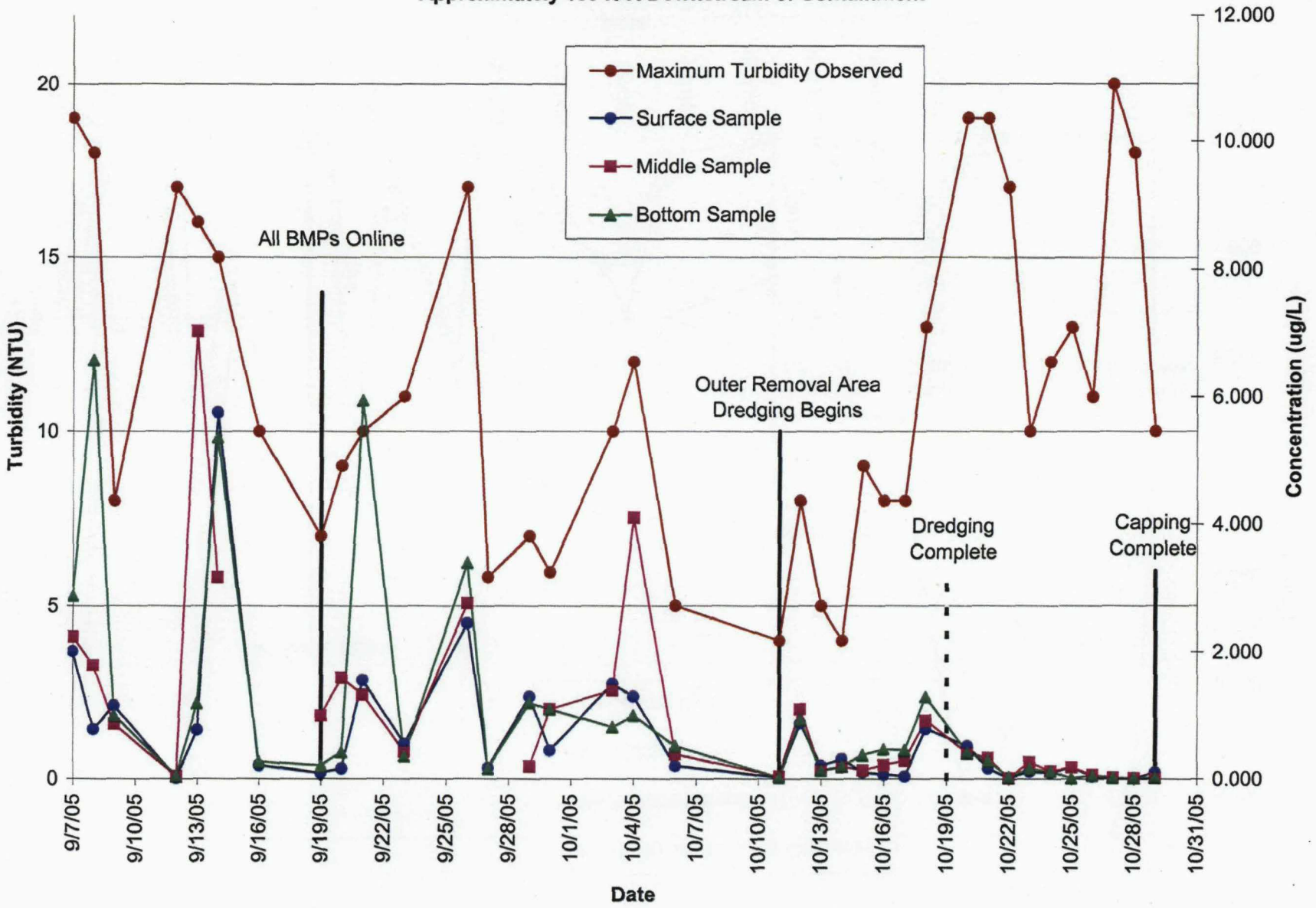


Figure 10
Gasco Removal Action
Daily Maximum Turbidity and Benzo(a)pyrene Concentration Trend
Approximately 150 feet Downstream of Containment



APPENDIX A

Field Notes

8-17-05 Wednesday

0820 arrive Cathedral Park, meet w/ Ryan Barth (Anchor) and Eric Parker and Dennis Lucia of Research Support Services. Plan today: collect background water quality & chemistry samples, observe removal of sediment traps and placement of sediment stakes

- Loading vessel, Elizabeth

0855 ~~Heather~~, Appy (Anchor) arrives. Ryan indicated they were unable to collect water quality data yesterday (boat, computer).

0915 Launch boat. Health & Safety meeting re: diving safety, boat safety, emergency procedures

0945 disembark, proceed to Cosco site. will retrieve sediment traps (3) first and upstream background chemical samples. Anchor is without VanDorn sampler so diver will obtain samples by sending down jars

1005 - 10' set up on upstream sed. trap position. divers preparing equipt. Anchor preparing sampling equipt.

1045 Diver (Eric) in water at upstream sed. trap.

1120 retrieve upstream sed. trap ⇒ photos

8-17-05 (cont.)

- Approximately 2.5 inches observed in sed. trap. Water temp = 72°. Siphon sed trap and place sediment in SS bowl, further decant ~8oz H_2O off sample ⇒ place sediment in 1 jar.

1145 lunch break. discuss locations of sediment stakes (by taking down containers)

PS: Diver collected lab parameter samples from 1 foot above mudline at upstream location (PAH, cyanide).

1230 setting up near sediment trap #2. Location obstructed by barge. proceed to sed. trap #3. Call from Wadsworth confirmed that a 2-2-2 placement of sed. stakes is acceptable.

1310 in position at Sed. trap location #3

1315 Diver in water to retrieve ST3

1345 Diver on board w/ ST-3. ~ 0.5" of sediment in trap. decant & place ≈ 4oz in 8oz jar.

1400 - proceed to sediment stake location and proceed w/ placing stakes in a 2-2-1 formation w/ 1 being upstream

1430 diver in water

1540 diver on board after setting 5 stakes - Paddle to fetch Anchors boat and if possible (if barge is gone) retrieve sed. trap #2

8-17-05 (continued)

1610 hrs at Cathedral Park to offload some equipment and retrieve Anchors boat. Boat will not be ready til 1700.

1630 - Decide to leave for the day. Will observe water quality parameters tomorrow afternoon.

End of Day

8-18-05 Thursday

1140 arrive @ Cathedral Park boat launch to meet w/ Anchor (Elizabeth Appy, Kelly Tidkencier). Plan on collecting 4 water quality parameters (background). Likely to collect four readings today, and three tomorrow, for a total of 7.

1220 - Calibrate meter: Hydrolab-Minisonde 4a, using various standards. Successful.

1240 Health & Safety meeting: Hospital location, fire extinguisher, etc.

1245 disembark for Gasco site. Will also collect the remaining lab water quality samples (PAH, cyanide)

1315 collecting first field parameter data set.

1340 collect temperature readings @ 1 ft & 20 ft below surface along transect (3 pt.)
73.6 @ 20 ft, 74.7 @ 1 ft

1355 prepare to collect lab samples (decon.), within dredge prism @ 1 ft below surface and 1 ft above mudline.
- Using the VanDorn sampler

1415 Collecting 1 ft bs sample for lab samples - decon equipt and collect 1 ft above mud line sample. Procedures and sample handling look good. (ice, decon, etc.)

8-18-05 (cont.)
1440 break for snack

1455 proceed to boat ramp to drop me off. Have observed todays tasks and feel procedures/specifications are being adhered to.
1515 depart for the day

End of Day

8-22-05 Monday
0800 Pre-Con Mtg

1030 arrive Gasco site via land w/ entire contingent of parties (NW Natural, Anchor, Severnson, etc.)
- Plan to observe site and view staging areas, discuss logistics
- PMX personnel: A. Somps, Rick Wadsworth
- Observe site and discuss minor pts. of intrest (tides, logistics, etc.)
1125 depart site w/ RW for office

EOD

8-24-05 Wednesday weather: clear skies

0900 arrive onsite @ Casco site. meet w/ Tim Stone (Anchor) and Mark (H&S, Severson) and disuss work to be done today:
1) laying anchors for curtain 2) Health & Safety issues.

★ Photos of diving boat & staged barge & dredge

- Severson/Hickey Marine currently setting anchors along ~~A-F~~ transect of ~~Control~~ inner removal area.
- Anchors appear to be spaced no more than 25 feet apart per specs. (& HEPP) Fig E-5.
- Placement of anchors started yesterday

1100 depart site for lunch w/ Tim Stone

1200 onsite w/ Tim Stone. proceed to shore to observe progess on anchor placement.

- Hickey working on inner containment transect

★ - Photos of transect, Sea Vulture (dredge), curtains on barge

- Severson has a trained diver on shore observing anchor placement as part of QA/QC. (Joe Adamson). Joe will be ~~placing~~ inspecting silt curtain placement for Severson.
- Severson setting up area where air bubbler equipt will be positioned. Area will be equipped w/ a containment area in case of leakage.

8-24-05 (continued)

1430 Hickey Marine still working on anchor placement along inner containment transect. Severson QA/QC observer (Adamson) onshore observing activity.

1630 Hickey Marine preparing to place additional anchors along inner containment transect closer to fueling dock.

1638 Diver in water.

1745 Diving crew (Hickey) struggling with high winds while placing anchors. Will continue to work til ~ 7pm

1750 Decide to depart for the day having observed all activities thus far.

End of Day

Andrew Stone

8-25-05 Thursday weather: clear skies

0845 onsite at Basco site. sign-in and brief on H&S.
- proceed to shore to observe activities.
- Severson/Hickey working on anchor/curtain placement with one stretch of curtain deployed at the F end point of inner containment area transect, and along beach until moved into water [Photos bubbler, curtain, pull-test on anchors]
- Severson/Hickey performing pull tests on anchors to meet specs. Discussion as to required strength (15,000 lbs initially), but conversation between Severson and anchor designer resulted in a revised strength of ↑ 6,000 lbs cumulative (?) ↓ sic add.
- Pull test conducted w/ use of dessicke attached to anchor w/ a torque guage in-line. ~~(X Photo)~~ AP

0940 one anchor came loose ⇒ will have to reset.
- Curtain design revised to use poly rope (1/4") instead of zip-ties to fasten curtain sections together ~~th thole at~~ AP below water.
- Pull tests will be performed at a greater percentage than called for ⇒ about 60% along B-F transect
- Observed on beach an ≈ 2'x 4' tar body at south stretch of shore near dilapidated wood structure [Photos]

8-25-05 (continued)

- Spoke w/ Tim Stone about updated specs. for anchor pull tests. Required strength is based on stress per lined foot of curtain which apparently results in a strength of ↑ ≈ 1,500 lbs per anchor. Will advise Rick Wadsworth of revision, and Anchor will be providing EPA with an updated spec sheet.
- 1025 called Wadsworth to apprise of issue.

1030 Hickey setting up to re-drive anchor that pulled out.

1200 Hickey preparing to pull portion of silt curtain into river.

1210 offsite to pick up ice & food

1315 onsite. Silt curtain pulled out to approximately point E [photo @ 1340 & 1351]
- Received phone call from RW regarding background water quality parameters (temp, NTU). Indicated that readings obtained last week were very close to current trigger levels, and wanted to know if I had any concerns as to the methods employed/calibrations by Anchor last week. I indicated I had none.

1425 Hickey setting up to drive more anchors along inner containment transect.

8-25-05 Thursday (continued)

1550 diver in water placing anchor

1620 Anchor (Tim Stone) indicated Severson and Hickey will likely be working Saturday to ensure schedule is adhered to.

1700 Hickey still working on F-B transect w/no other activities to be initiated today.

1715 Depart site for the day

End of Day

8-26-05 Friday weather: clear skies

0830 onsite @ Basco site. Sign visitors log and brief on H&S.

- Hickey setting anchors along inner transect, Diver in water.

1108 Diver out of water, Anchor attempting to resolve an issue with the fueling vessels and the oil boom used as part of the process; The boom is in the way of the B end of the inner transect. A concern also exists with future fueling tankers impacting the silt curtain by being in the way and/or propeller wash creating unwanted forces against curtain.

1200 Northwest Underwater (NU), Hickeys diving subcontractor, positioning for more anchor placement.

- Tim Stone, working w/ fueling dock manager, has apparently resolved the issue w/ fuel barges in close proximity to silt curtain.
- Spoke w/ RW, and he suggested stopping by tomorrow for a few hours to check in on progress.
- NU continuing to set anchors along inner transect

1700 Depart for the day

End of Day

8-27-05 Saturday weather: partly cloudy breezy

0945 onsite. sign-in. Severson indicated a pre-dredging H&S mtg will occur Wednesday to address specific dredging concerns (PPE, etc)
- NU positioned at point B setting anchors.
☆ [photos]
- Surveyor onsite w/ boat checking coordinates of buoys (transect), doing bathymetry.

1120 - observed NU performing pull test on anchor using winch & torque guage. Holds.

1115 - First anchor along A-B transect set.
- Will be working on A-B transect til about 3pm. Current low tides forcing NU to dive rest of anchors using smaller boat.

1140 - Severson indicated there are 4 submersed pilings in way of transect/curtain and they will have to cut them out and haul.

1215 Tim Stone Waterways Management to inquire as to placement of "No Wake" buoys to prevent large wake impacting ~~comp~~ containment area. Currently will broadcast a notice over VHF.
- Severson/NU will be working on A-B transect, the rest of the day.

1230 End of Day

8-29-05 Monday - intermittent light rain - mostly cloudy

0900 onsite at site. Sign-in. Discuss wake issue with Tim Stone; he indicated Coast Guard will likely deploy "No Wake" buoys at either end of project site to prevent releases resulting from large wakes.
- NU working on removing submerged pilings in way of silt curtain along B-A transect. Anticipate deploying more silt curtain today.

1200 NU preparing silt curtain for deployment.

1220 NU deploying F-B silt curtain (impermeable)

1330 Weather changing to dark skies ⇒ rain

1400 NU, due to thunder/lightning, taking time off. I believe the standard for crane/diving work is 30 minute wait after last thunder.

1505 NU resuming work, placing marking buoys for ~~entire~~ curtains are actually being staged for deployment adjacent to barge.

At bedload bottle ~~containment area~~, while also staging more curtain along side barge. Plan to place permeable containment curtain along A-B transect at inner reservoir area

1600 - NU attempting to relocate FAMM oil boom to allow room for A-B curtain, with oil boom downstream of curtain.

1700 While NU moving a trimmed pylon they stirred up a large sheen of oil off the bottom near

8-29-05 Monday

A-B transect ⇒ Deploying sorbent boom to containerize as much as possible. Tim Stone & Severson personnel all aware of sheen. I phoned RW to apprize of situation.

- Oil boom deployed along with sorbent and sheen contained. Efforts to control sheen are effective. Oil boom tied in place and will remain.

Depart for the day

End of Day

8-30-05 Tuesday overcast

0900 onsite. Sign-in.

- Permeable curtain deployed along A-B transect. Oil boom & sorbent still in place from yesterday.
- NW/Hickey set up near pt. B w/ derrick & barge deploying bubble curtain
- H&S and project discussions earlier today addressed concerns about boats churning up more sediments and sheen.
- Observations this morning of work area show various small sheens from tar body. Discussion with Tim Stone & Joe Burke resulted in deciding to deploy FAMMS finding boom to containerize and minimize dispersal of sheen, until deployment of boom & curtain.

1120 continuing deployment of bubble curtain along southern reach of containment areas

1305 lowering sand bags to bottom for placement along bubble curtain

1315 offsite to get lunch.

1335 onsite. NW/Hickey still working on bubble curtain, setting sand bags.

1630 still working on bubble curtain with no different tasks anticipated today

1645 depart

End of Day

8-31-05 Wednesday overcast, breezy

0800 onsite. Sign-in, de-brief on H&S.

- Additional divers onsite today to aid in deployment of containment barriers; Two dive teams will be deploying bubble curtain and sand bags.
- Preparing dive teams and stretch of bubble curtain

0920 Bubble curtain positioned along outside stretch of containment area.

~~0930~~

1000 Anchor, Severson & Hickey having in-house meeting.

1030 offsite to office

1250 onsite. Crew working on bubble curtain.

1315 repositioning barges/derricks to south along outer containment area. Continuing to place bubble curtain piping and sand-bags.

1700 depart site for the day

End of Day

9-1-05 Thursday breezy clear skies

0830 onsite. Sign-in.

- Crew placing bubble curtain piping on south end of containment area towards shore, while sand bags are being placed along outer stretch.

0845 Bob Wyatt (Marine Env. Testing) onsite with ~~EPA representative~~

1000 Spoke w/ Tim Stone as to schedule and he indicated, per conversation w/ Joe Burke, that activities are on schedule. Also stated that sediment traps will be deployed Tuesday after curtains are unburied, as will fish seining. I apprized RW of such.

1130 Final connections being made on bubble curtain, at south end of containment area.

1220 Final bubble curtain connection complete.

1240 John Malek (EPA) onsite to collect additional field parameters (DO, etc.) with Anchor personnel (~~Hammel~~ Patterson, Tittemeier)

~1310 DEQ Rep onsite to join Malek on boat w/ Anchor personnel

1320 above personnel disembarking to collect samples

1330 offsite for lunch.

1350 onsite. NW/Hickey preparing silt curtains

↓

9-1-05 (cont.)

1515 Asked by Joe Adamson (Severson) if it would be ok to widen the points (~ 20 ft each side) where the bed-load baffle meets the inner cont. area (B-E transect). Call RW to gain approval. I don't see a problem with the request. RW will let me know.

1550 RW stated (via phone) that ~~that~~ would be ok to ensure the baffle is taught.

1600 Joe A then indicated the point couldn't be reached and will wrap the baffle onto itself to keep it tight if need be.

- NU/Hickey crew setting concrete anchor blocks for securing the bed-load baffle

1655 Anchor, EPA & DEQ done with background sampling and coming ashore. John Malek indicated todays DO readings were in the 7-8 range.

1730 NU prepared to deploy bed load baffle, but the tide/current may be too fast. Will conduct flow test to see.

1745 depart site for the day.

EOD

9-2-05 Friday slightly overcast, calm

0755 onsite. Sign-in. NU/Hickey crew working on placement of bed-load baffle.

0815 Anchor personnel (Ryan Patterson, Kelly Titkemeier) onsite to collect additional water quality parameters (4 data points). I will join them on the boat.

0825 proceed to sampling boat. Set up equipment (new Hydrolab unit), same unit as that used yesterday. Calibrate unit. DO calibration factors in barometric pressure.

0840 spoke w/ Joe A (Severson) and he indicated they managed to deploy a 50-foot stretch of bed load baffle yesterday, but that it required 3 lengths of chain to submerge it. Currently working on deploying the 150' stretch on the riverward side.

- Calibration: DO: using % saturation method with DI water, waiting til stable. Calibration successful. pH: using 7.0 & 10.0 standards ⇒ calibration successful. turbidity: using 20 & 100 NTU standards, calibration successful. EC: successful using DI & 1412 std

0930 done calibrating.

0938 disembark.

9-2-05 (cont.)

0950 collecting first set of readings. Depth = 33'
1'bs: t = 21.44°C, pH = 7.17, NTU = 8, DO = 7.57, EC = 92 MS
16'bs: t = 21.41°C, pH = 7.15, NTU = 9, DO = 7.39, EC = 93 MS
32'bs: t = 21.35, pH = 7.13, NTU = 15, DO = 7.27, EC = 90

- collect water sample @ surface depth to cross-check DO readings using HACH: 7.32
- NTU cross-check using HACH: 7.42
- titrated until solution is clear w/ floc being blue

1100 1': t = 21.5, pH = 7.23, NTU = 4, DO = 7.89, EC = 91
16': t = 21.4, pH = 7.16, NTU = 10, DO = 7.41, EC = 92
32': t = 21.36, pH = 7.14, NTU = 12, DO = 7.30, EC = 92
16' cross-check: DO (HACH) = 7.84, titrating until entire contents are clear. NTU = 6.59
- spots of algae

1140 1': t = 21.62, pH = 7.27, NTU = 4, DO = 8.01, EC = 91
16': t = 21.41, pH = 7.19, NTU = 7, DO = 7.62, EC = 92
30 AF
32': t = 21.34, pH = 7.14, NTU = 14, DO = 7.29, EC = 91
30' cross-check: DO = 7.54, NTU = 11.8

1145 deploying next section of bal load baffle

1220 1': t = 21.84, pH = 7.29, NTU = 11, DO = 8.18, EC = 90
17/16': t = 21.44, pH = 7.18, NTU = 8, DO = 7.65, EC = 91
34: t = 21.36 pH = 7.13, NTU = 13 DO = 7.34, EC = 91
~~cross-check: DO = , NTU = 8 AF~~

1240 leave sampling point.

1245 onshore, depart site for lunch. Anchor will collect some additional points for their own reasons.

9-2-05 (cont)

1310 onsite. NW/Hickey crew working on baffle. Anticipate finishing the baffle and testing the bubble curtain, and maneuvering the derrick into the containment area, and then calling it a day

1520 depart site for the weekend

End of Day

Note:
Labor Day
9-5-05

9-6-05 Tuesday breezy clear skies

0850 onsite. Sign-in. Talk w/ Joe Adamson who indicated the bubble curtain was tested for 4 hours Saturday and silt curtains deployed
- Currently making connections on silt curtain.
- Oil boom w/ skirt will be deployed along with oil sorbent boom, bubble curtain activated followed by fish seining.
- Barges should be showing up around noon and thereafter with the first dredging possibly occurring this afternoon.

0910 Inspect curtains @ surface ⇒ All appears intact.

0945 Discuss w/ Tim Stone : 1) placement of sed. traps
2) lab samples to Fed Ex today if possible.
- preparing to seine fish

1000 Spoke w/ Ryan Barth about sediment traps being placed. He stated they will be going in tomorrow morning. I apprised Rick Wadsworth(RW) of such and he is ok with that.

1035 Spoke w/ Carl Stivers (onsite) about the preference for any lab samples collected today (if any) to be trasported to Fed Ex today. He indicated that w/ only 6 dredge buckets being done today that they might not be collecting lab samples. I stated I would let RW know and see how he feels about that, stating also

9-6-05 (cont.)

that RW would most likely request that a sample be collected.

1140 Fish seining beginning.
- Transfer barge and drying barge offshore, (In position ≈ 1215)
[Offload barge Monday, transport Friday]
- Seining thus far captured 3 juvenile fish (1 bass, 2 unknown
- Stivers indicated first barge would likely arrive in Boardman Friday w/ offloading Monday.
- RW indicated as long as practice dredging today does not exceed 1-2 hour duration that not collecting lab samples is ok.
- Seining : 19 shad, 1 smallmouth bass, 1 larval shrimp
- Divers working on silt curtain (locking together)

1320 offsite for lunch

1345 onsite. Seining still. Divers working on curtain. History crew working on transfer barge containment structures and spill plates.

1440 placing extra oil boom around derrick to keep oil slicks off sides of derrick.
- Still seining

1600 done seining, no endangered/threatened fish

9-6-05 (cont.)

1630 pasitioning transfer barge. Other barges not yet onsite ⇒ outer skirt not deployed.

Fish count:

Shad: 94. 1 LM Bass. 2 Stony Flounder

~~Bass?~~ 1 larval shrimp. 1 crayfish

SM Bass: 45 Perch: 19

1 sculpin. No endangered fish.

1650 Since outer curtain not yet in place there will be no ~~practice~~ test dredging.

- Drying & haul barges are expected at 8am tomorrow

1700 Hickey deploying oil adsorbent boom in immed. cont. area.

1715 Bubble curtain activated

1745 offsite

End of Day

First day of Dredging

9-7-05 Wednesday clear skies, breezy

0830 onsite. Sign-in. Drying and haul barges onsite being positioned. Outer boom being positioned while barges are being placed.

- Bubble curtain active

0845 Barges in place

0905 Divers (Research Support Services) onsite to place sediment traps.

- Continued deployment of outer boom, and staging of barges & equipment.

1015 Concern raised by Tim Stone as to apparent increase in turbidity produced by bubble curtain. There does appear, from shore, an increase in brownish haze to the river. Anchor is going to collect some additional readings. I am remaining on shore due to the fact that it appears dredging may begin soon. I phoned RW, left message re: developments.

1035 2 of 3 sediment traps deployed

1040 Anchor collecting readings downstream in 3 locations: 1) ≈ 150' down from curtain, 2) ≈ 150' downstream from outside corner of haul barge, and 3) mid-channel outside bubble curtain.

Over

9-7-05 (cont.)

1100 Anchor also collecting readings upstream in background location (≈ 300 ft upstream)
- Divers working on a part of the silt curtain that appears to be flapping/loose at the bottom. ⇒ Note: actually resting on shallower bottom 1135
1110 Spoke directly w/ RW about bubble curtain turbidity issue. I stated I will let him know as soon as I get some data.
1150 According to Carl Stivers, NTU readings downstream of bubble curtain are around 10 NTUs. (Surprisingly low)
1208 called RW to advise of turbidity readings. 95th% background data: (ranges actually):

NTU - 4 - 17
pH - 7.1 - 7.3 (higher ⇒ upper layer ⇒ deeper)
DO - 7.3 - 8.3
temp - 21.3 - 22.5 , " "

1250 first dredge bucket in the water dredging.
- Approximately 1 bucket every 5 minutes.
1310 - can see oily sheen accumulating against booms.
- Bucket, once removed from water, is held stationary above dredge point to allow water/slop to fall out, then slowly moved to

9-7-05 (cont.)

transfer barge. Spill plates are effective. ~~Material~~ Bucket positioned just above barge and dropped approximately 1 foot, minimizing/negating any splash.
- Material removed thus far appears to be contaminated sediments.

1330 proceed to Anchor sampling boat to observe ~~background~~ upstream & downstream water quality readings.
1340 disembark to upstream location
- strong winds, cle
1350 surface: NTU = 5, pH = 7.3, t = 21.34, DO = 8.63
≈ 10' bs: NTU = 5, pH = 7.26, t = 21.12, DO = 8.41
18' bs: NTU = 13, pH = 7.18, t = 2088, DO = 7.94

Downstream:	NTU	pH	t	DO	EC
~~surface~~	~~15~~	~~7.19~~	~~21.05~~	~~8.39~~	~~94~~
trouble being stationary ⇒ move	13	7.19	21.02	8.30	94
17'	16	7.18	21.00	8.22	94
37'	19	7.16	20.99	8.15	94

1420 collecting water sample for lab analysis 1' below surface, 19.5' bs, and 37' bs
1445 to shore to drop off samples. Anchor personnel advised CRAO of turbidity exceedances.

9-7-05 (cont.)

Turbidity: Noted that strong wind blown waves are crashing on shore ~~east~~ downstream of dredge, creating/contributing to turbidity.

- Also noted shoreline adjacent to upstream background location is comprised primarily of rip-rap, with little turbidity created

1500 called RW to apprize. Carl Stivers called RW, and will call John Malek (EPA).

1520 back at boat to collect more readings.

- Malek, per via Anchor, stated to keep sampling and agreed that turbidity may be attributable to wave action at shores edge. Also suggested taking some readings w/in cont. area or close so as to ascertain a gradient.

1550 disembark

Upstream:	pH	NTU	temp	DO	EC
1' bs	7.31	5	21.33	8.75	93
17' bs	7.22	5	21.11	8.4	93
34' bs	7.07	18	20.79	7.64	95

1615 proceed to downstream ~~inner~~ outer location

Note: inner location inaccessible due to fueling barge.

over

9-7-05 (cont)

- Downstream outer:

	NTU	pH	t	DO	EC
1' bs	13	7.16	20.84	8.33	95
22.5'	26 17 #	7.15	20.87	8.28	96
43'	15	7.16	20.86	8.19	96

- Downstream middle:

	NTU	pH	t	DO	EC
1' bs	18	7.17	20.97	8.33	95
21 bs	18	7.15	20.92	8.26	96
42' bs	15	7.15	20.85	8.16	95

Upstream @ 1655

1'	6	7.26	21.07	8.52	93
17'	7	7.20	20.89	8.22	94
33'	20	7.11	20.64	7.74	98

Downstream outer: ☆ Reverse current ☆

1715 1'	10	7.21	21.11	8.39	94
22'	12	7.18	20.99	8.27	95
44'	15	7.15	20.92	8.16	95

Downstream middle:

1730	8	7.21	21.04	8.43	94
22'	10	7.20	21.03	8.31	92
43'	15	7.16	20.92	8.13	95

9-7-05 (cont.)

1745

Upstream	NTU	pH	t	DO	EC
1'	19	7.22	20.98	8.57	95
18'	15	7.18	21.06	8.43	95
39'	19	7.18	21.04	8.37	95

1750

Downstream 1'	8	7.28	21.02	8.52	94
outer 22'	7	7.21	21.02	8.34	94
44'	14	7.16	20.80	8.02	94

1752

Downstream middle

1'	8	7.20	21.02	8.35	94
22'	9	7.19	21.05	8.30	94
43'	9	7.17	21.02	8.21	94

1755 back at dock
- Note: starting @ ≈ 1730 tide chart indicates the begining of reverse current.

1800 Dredging done for the day. Transfer derrick transferring remaining material to haul barge.
- Tim Stone estimating 800-900 cu yd.
- Observe activities and inspect site

1830 Offsite

End of Day

9-8-05 Thursday clear skies, breezy

0830 onsite. Sign-in
First dredge bucket in the water @ 0800

0900 disembark for water readings w/ Ben Hung & Kelley Rittenour (Anchor)

0915 Upstream readings collected

0920 proceed to downstream locations
- Notice dredge has switched to a different bucket other than the "environmental bucket"

0928 Downstream-outer readings collected.

0937 Downstream-middle
NTU: 1'bs = 10, 23'bs = 11, 45'bs = 17.65

0945 Collecting lab samples at downstream middle location (PAH, cyanide)

1007 Collect downstream-inner field readings
NTU: 1' = 14, 17' = 17, 33' = 17

1017 onshore to drop off samples.

1025 Discussion w/ Anchor personel as to sampling frequency (every hour until 4 consecutive non-exceedances). Question as to wether this is on a daily basis or just at the onset of in-water activity.

1035 Observed the need for spill plate mechanism to be improved. It appears drippings can fall into 2° containment

9-8-05 (cont.)

area between silt curtain and transfer barge.

1045 Spoke w/ RW about sampling frequency and he indicated, contrary to what is suggested in the plan, that the frequency is indeed to every four hours after the initial hourly readings, assuming no exceedances. According to Anchor personel, John Malek is not considering the 17-19 NTU readings from yesterday and today as exceedances. I stated that we need to know what will be considered an exceedance.

- RW also stated that the EPA should have been notified of switch over to different dredge bucket.
- Carl-Stiver is calling RW to discuss issues re: frequency, trigger levels

1115 offsite to get lunch

1135 Spoke w/ RW: he received tentative approval from Sean Sheldrake regarding dredge bucket, but that Carl should receive approval from John Malek as well.

1150 onsite. Carl has received verbal approval from Malek re: dredge bucket.

9-8-05 (cont.)

- Dredging ceased for ≈ 1 hour

1215 Dredging commenced

1230 on board boat to prepare for field measurements

1300 at Upstream location

1'bs: t = 21.28, pH = 7.29, EC = 99, NTU = 4, DO = 8.34

11'bs: 20.63, 7.20, 99, NTU = 9, DO = 7.96

35'bs: 20.59, 7.16, 99, 20, DO = 7.72

boat moving around

1305 proceed to downstream locations.

Downstream outer:

1'bs: 20.71, pH = 7.24, 99, NTU = 10, DO = 8.20

23': —, pH = 7.19, 99, 11, 8.09

44': 20.66, 7.18, 99, 12, 8.05

~~middle~~ 1'bs: NTU = 10

Downstream middle

1' 20.68, 7.20, 99, 10/11, 8.18

22' 20.69, 7.19, 99, 12, 8.13

43' 20.68, 7.17, 99, 14, 8.05

- Inner location inaccessible ⇒ proceed to upstream to gather continuatory NTU reading ⇒ 5 NTU

1340 onshore. Anchor ~~attempting~~ preparing to collect grab samples from silt curtain-mudline interface for visual observation.

9-8-05 (cont.)

1420 observing dredging activities.

1435 - Mudline - silt curtain interface: Upstream sample collected in 15' of water using skiff. No anomalous conditions observed (no odor, no oily residue). Few algae blobs, relatively clear water.

1455 - Downstream sample collected from cat-walk in ≈ 20' of water at point B. No anomalous conditions. Slightly more turbid than upstream sample ☆photo☆

1500 observing dredging activities. Inspect shoreline of inner containment area ⇒ Less sheen than expected

- Barge appears to be nearing capacity. It is expected (by Severson) that the next barge will be here before first one is full.

≈1515 Surveyor onsite to prepare for bathymetry surveying

- 1800 - 2000 cu yd barge
  600 cu yards yesterday
- New barge in the morning. Offload monday morning
- Joe Burke stated the divers did a complete inspection of silt curtain from E-B ⇒ intact w/ no tears.

9-8-05 (cont.)

- 700' tanker expected next Thursday night ⇒ will need to reef barges back. Probably lose Thursday afternoon and Friday morning.

1650 disembark to collect final water readings for the day

1655 Upstream	±	pH	EC	NTU	DO	
1' bs	21.32	7.42	105	5	8.89	
15' bs	21.01	7.23	103	8	8.17	(69.8°F)
28' 30'	20.56	7.11	98	18	7.62	

Downstream readings

1705 Outer					
1'	21.17	7.22	98	11	8.37
22'	20.87	7.20	98	14	8.24
43'	20.83	7.18	98	13	8.18
1718 middle					
1'	21.20	7.22	98	11	8.39
22'	20.88	7.19	98	12	8.25
43'	20.89	7.18	98	14	8.19
1725 inner					
1'	21.14	7.24	98	11	8.36
15'	20.98	7.20	98	12	8.28
30'	20.91	7.18	98	15	8.16

Confirm upstream NTU: 1' bs = 15
15' bs = 17
Very close to reverse tides/current

9-8-05 cont.

1745 back onshore. End of day calibration
- Dredging ceased @ 1730

1800 offsite

End of Day

9-9-05 Friday ... overcast, drizzle

0900 onsite. Sign-in.
Various visitors onsite: Eric Blischke (EPA)
- No dredging yet today. rain stopped @ ~920
Also onsite: Rene Fuentes, Matt McClincy (DEQ)
Heidi Blischke (DEQ), Mike _ (HAI)
- Visitors observing from the st bank.
- 2nd Barge not yet onsite
- Dredging waiting til outer oil boom repositioned (came loose yesterday evening)

1020 Dredging. Divers working on outer boom.
- Met Adam Barack & Craig Christian w/ EI, observing from bank. EI noted concern about the spill plate and preventing material from falling into outer cont. area.

1120 proceed to boat to collect water quality readings & lab sample

1128 disembark

1135 at upstream location.

Upstream	T	pH	NTU	DO	Ec	@1142
1'bs	20.37	7.32	1	8.12	95	
20'bs	20.35	7.26	7	7.96	95	
39'bs	20.35	7.26	6	7.88	95	

9-9-05 (cont.)

	t	NTU	DO	pH
95th % Surface	22.29	8.29	8.22	7.28
Mid	22.02	9.63	7.67	~~7.28~~ 7.19
Bottom	21.54	15.56	7.43	7.15

1147 proceed to downstream locations

-Downstream	t	NTU	DO	EC	pH @1159
outer 1'bs	20.38	6	8.11	95	7.25
23'bs	20.38	6	8.03	95	7.24
45'bs	20.38	7	7.98	95	7.24
DS -mid 1'bs	20.38	7	8.16	95	7.26
22'bs	20.38	7	8.08	95	7.23
45'bs	20.38	8	8.00	95	7.22
-DSI 1'bs	20.37	4	8.15	96	7.26
17'	20.38	7	8.06	96	7.25
33'	20.38	7	8.01	96	7.23

- Dredging ceased @ ≈ 1205
- Collect lab samples at downstream inner location

1225 proceed ashore. No 2nd barge yet, ~~at~~ Derrick mixing in drying reagent

1240 offsite to get lunch.

1310 onsite. No dredging

1400 - Spoke w/ Joe Burke re: barge schedule.. He indicated offloading will most likely not start Monday, but Tuesday morning instead. I apprized RW of such.

9-9-05 (cont.)

1500 Tim Stone advised me that no more dredging will occur today.
- Barge will be torped onsite and then hauled offsite ≈ 1600. 2nd Barge to be in place Monday morning

1515 offsite

End of Day

Andy Stone

NOTE: Downstream outer = DS3
" middle = DS2
" inner = DS1

~~9-8-05~~

~~1245 back onshore. End of day calibration~~

~~- Dredging ceased at 1730~~

Blank

9-12-05 Monday overcast, calm

0850 Onsite. Sign-in. 2nd barge in position w/ 1st barge offsite

0925 Dredging using environmental bucket, and dredge operator appears to be taking greater care in avoiding slough and clippings.

Note: 1st barge out @ ≈ 0800, 2nd one in @ ≈ 0825

1020 disembark to collect water quality data.

- Calibrated instruments (Hydrolab)
- Dredged for ≈ 1 hour and ceased @ ≈ 1030 while repositioning reagent barge

US	±	pH	EC	NTU	DO	
1'bs	19.81	7.29	88	10	8.22	
10'bs	19.82	7.28	91	12	8.17	boat spinning
⇒ 25 20'bs	19.84	7.28	88	12	8.15	

- No sheen, appears to be slack tide
- 0.15 water velocity using flow meter

1050 Clouds clearing ⇒ sunny, light breeze

1055 Downstream

DS3:	±	pH	EC	NTU	DO
1'bs	19.87	7.28	89	9	8.31
22'bs	19.85	7.26	88	11	8.20
43'bs	19.86	7.28	88	11	8.13

1058 Dredging

over →

9-12-05 (cont.)

1100

DS2:	t	pH	EC	NTU	DO
1'	20.00	7.29	88	8	8.30
21'	19.87	7.28	89	10	8.23
42'	19.85	7.24	89	13	8.04

- Collect lab parameter samples

DS1:

1120	1'	19.99	7.28	89	8	8.29
	15'	19.9	7.28	88	9	8.22
	30'	19.86	7.27	89	9	8.12

1130 onshore. observing dredging.

1145 offsite to get lunch

1215 onsite. Dredging

1245 cease dredging to address submergence of silt curtain, below spill plate. Hickey attempting to fix the curtain.

1320 Silt curtain fixed and floating.

1325 reposition Derrick slightly north, and reel barges in same direction

1420 Disembark for water quality readings.

US	t	pH	EC	NTU	DO
1'bs	21.36	7.3	88	3	8.49
13'bs	20.01	7.23	89	8	8.36
30'bs	19.94	7.21	89	10	8.24

9-12-05 (cont.)

1445

DS3	t	pH	EC	NTU	DO
1'	20.04	7.21	90	11	8.40
22'	20.02	7.19	90	12	8.37
44'	20.01	7.19	90	14	8.26
DS2					
1'	20.07	7.27	90	12	8.39
22'	20.06	7.19	90	15	8.37
44'	20.04	7.19	90	17	8.32
DS1 @ 1500					
1'	20.18	7.21	90	14	8.43
17' @	20.03	7.21	90	14	8.34
~~N34~~ 31'	20.03	7.21	90	14	8.30

- Dredge switching to other bucket.

- Confirmatory NTU reading at US

1508 1'bs 5

13'bs 6

35'bs 11

~1515 Dredging w/ other bucket

1524 onshore observing dredging

1700 disembark for water quality readings

1702	t	pH	EC	NTU	DO	
US 1'	21.97	7.49	92	4	8.49	⇒ remove
16'	19.90	7.26	89	12	8.10	
31'	19.83	7.19	90	16	7.92	
⇒ 1'	21.87				9.53	

9-12-05 (cont.)

	T	pH	EC	NTU	DO
DS3 1'	20.12	7.26	89	10	8.57
22'	20.07	7.24	90	~~10~~ 11 #	8.49
44'	20.10	7.24	90	11	8.38
DS2'					
1'	20.15	7.30	90	10	8.61
22'	20.11	7.25	90	11	8.48
42'	20.13	7.24	90	12	8.44

- Apparently in reverse of or slack tidal conditions
⇒ Suggested Anchor develop a definitive means of determining flow. Flow meter does
1738 not perform as expected. ⇒ Tide charts

DS1					
1'	20.24	7.30	89	9	8.60
15'	20.13	7.26	89	11	8.49
30'	20.12	7.26	90	12	8.46

1742 Onshore, observing dredging activities.
1800 Dredging done for the day
- Surveyor onsite doing bathymetry.
- Tanker expected Wednesday end of day ⇒ Likely no dredging Thursday.
- Dewatering transfer barge.

1820 Depart site for the day.

End of Day

Tim Stone

9-13-05 ~~Tuesday~~ Tuesday overcast, light breeze

0940 Onsite. Sign-in

0910 Tim Stone found dead Salmon on beach ⇒ Dredging ceased immediately.

0815 dredging ~~was~~ started

- Fish was first observed by bucket operator on beach under pipeline.
- Agencies have been notified.

0915 John Malek onsite, coincidentally

1000 Walking shoreline to search for any other fish. None observed. Munn

- Tim Stone on phone w/ NMFS (Nancy)
- Divers have inspected the silt curtain to check for any breeches in containment.

1010 Malek suggested possibly using fish finder to scope containment area for additional fish.
- Yardage dredged yesterday: 932 cu yd
Cumulative yardage thus far ≈ 2,800 cu yd.

(NMFS)

1035 Tim Stone received word from Nancy Munn to resume work, and freeze fish.
- Malek requested that using fish finder tomorrow to look for additional fish, and o.k'd resumption of work.

1050 Spoke w/ RW to apprize of status.

9-13-05 (cont.)

1155 1055 Malek indicated that he would like, per the Water Certification (pg. 13), ① water samples collected in the containment area subsequent to a dead/distressed fish being found again. ② Also would like samples from the containment area to be collected following 2-3 days of continual dredging for determining the DO and total sulfides. These analyses also apply to # ① request, per Water Cert.

- Malek stated he believes the fish was most likely killed by the dredging based on condition of fish (not stiff, pink gills).
- If fish finder finds fish in containment area ⇒ need to look for them on a daily basis and determine if they can be captured.

1208 Dredging resumed. clear skies

1210 offsite to get lunch

1230 onsite, observing dredging w/ John Malek.
- Concurred dredge operator is doing what he can re: drippings with the available equipt.

1310 on boat to collect water quality readings
- Anchor using Flagging on probe to ascertain flow direction while anchored/stationary ⇒

9-13-05 (cont.) W 940 500

Reverse flow conditions. ⇒ After sampling locations

- @ 3' bs 0.62 fps
- Collecting background readings in downstream location

		±	pH	EC	NTU	DO
"US"						
1340	1' bs	20.24	7.30	98	6	8.77
	22.5'	19.80	7.23	99	8	8.39
	44'	12.52	7.20	99	10	8.24
"DS1"		Velocity = 0.13 fps, ribbon neutral				
1350	1' bs	20.02	7.31	99	9	8.88
	6' bs	19.66	7.23	98	12	8.65
	11' bs	19.66	7.21	98	13	8.67
"DS2" @ 1405						
	1' bs	19.69	7.27	99	12	8.67
	20.5'	19.69	7.21	99	12	8.58
	40'	19.67	7.21	99	12	8.50
"DS3"						
	1' bs	19.73	7.32	99	12	8.76
	21' bs	19.71	7.21	99	11	8.61
	41' bs	19.75	7.20	99	13	8.55

- "Exceedance" @ surface ⇒ confirmatory

1422 NTU readings @ "US" location = 5 NTU

1430 onshore, meet w/ Sheldrake, Nancy Munn (NOAA), Judy Smith (EPA).

9-13-05 (cont.)

- Divers have been onsite all day inspecting and fine tuning curtains, bed load battle

1540 - Sheldrake indicated need to collect lab sample today since we do not have data back yet, as opposed to falling onto weekly sampling schedule.

- Also raised concern about diver decon and the type of gloves being used by divers and others onbarge.

1600 - Sheldrake & Smith offsite.

1620 - relayed H&S concerns to Severson HSO.

1625 on boat to collect field and lab samples.

1644 anchored and collecting river velocity measurements in mid-channel

- Flow appears to be in downstream direction 0.51 fps ≈ 1 hour after slack tide

1655	US	± 35	pH	EC	NTU	DO
	1'bs	20.46	7.40	99	6	9.40
	18'bs	19.73	7.21	98	8	8.72
	38'bs	19.62	7.16	98	13	8.45
1715 DS3-	1'	19.79	7.37	98	9	8.88
	23'	19.76	7.21	98	9	8.74
	45'	19.77	7.19	98	9	8.68
1711 DS2-	1'	19.80	7.22	98	9	8.84
	22'	19.78	7.18	99	11	8.70
	43'	19.78	7.17	99	13	8.64

9-13-05 (cont.)

	±	pH	EC	NTU	DO
DSI 1'bs	19.97	7.29	99	13	8.77
16'	19.82	7.15	99	15	8.57
31'	19.80	7.16	99	16	8.56

- Collect lab samples

1745 Collecting turbidity readings along downstream transect. Close in ≈ 20' outside curtain readings ~~up to~~ 19, 27, 25 from surface to bottom, respectively.

≈ 50' down 15, 20, 20

150' 13, 15, 16

- Dredging ceased @ ≈ 1745

1755 onshore

1815 depart site for the day

End of Day
9/13/05

9-14-05 Wednesday partly cloudy, light breeze

0830 Onsite. Sign-in Dredging @ ~ 0745

0840 proceed to boat to collect readings.
- Meters calibrated. Flow = 0.20 fps

0900	±	pH	EC	NTU	DO
US 1'	19.30	7.33	92	7	8.73
13'	19.36	7.31	92	7	8.63
27'	19.22	7.26	94	11	8.63
DS3:1'	19.17	7.25	89	9	8.68
22'	19.19	7.25	90	9	8.61
0923 44'	19.19	7.27	89	8	8.54
DS2:1'	19.18	7.25	90	11	8.68
22'	19.19	7.25	90	12	8.59
44'	19.19	7.25	90	14	8.48
0945 DS1:1'	19.21	7.26	90	12	8.64
20'	19.20	7.25	90	13	8.58
37'	19.21	7.24	91	15	8.45

0925 Collect lab samples
- Sheen observed outside silt curtain w/in 2° containment ⇒ ~~Boom~~ Oil sorbent deployed and sheen mopped up.

0950 onshore, observe dredging and inspect shoreline. No issues.

1025 Received word that dredge material is too wet at the offloading facility

9-14-05 (cont.)
- Divers working on anchors for oil boom and bed-load baffle, anchors for 2nd cont. area.
- Clear skies.

1050 offsite to get lunch. Received call from RW re: EI and their complaint about tugging on the silt curtain. I stated that it has been a normal part of manipulating fine tuning the curtain and that it doesn't create a hole for fish passage.

1120 onsite, observing dredging.

1238 Observed distressed fish swimming in 1° containment area ⇒ Ceased Dredging and notified Tim Stone
- Fish picked up and given to Anchor
- I stated that Anchor needs to make sure to follow WQ Cert guidance.
- Also apprized of exteedances of acute water quality criteria by RW

1310 Observed another two fish (2) floating in dredge prism. Anchor prepping to collect DO & total sulfide samples w/in 1° cont area. Requested Hilkey pick up fish.
- Advised by RW to direct Hilkey to cease pumping de-water into 1° Containment area. and irrate all

9-14-05 (cont.)

possible BMPs.

1335 retrieving fish, they're still alive.
Bluegill - 4", Sunfish 5"

- Tim Stone attempting to revive and possibly set them free, per Carl Stivers.

1340 - Sample bottles arrive onsite for collection of total sulfides. 1345 time inside, 1348 time outside

DO Readings:

Outside - 8.81 mg/l 1-2'bs, NTU = 8

- Attempted revival of fish unsuccessful.

Inside - DO=7.75 @ 1'bs, NTU = 65
DO=7.48 @ 10'bs, NTU = 93
DO=7.26 @ 19'bs, NTU = 112, pH=6.87
DO=7.49 @ 10'bs (preparing for) NTU=80-95, pH=6.89

1400 - Hickey working on barge positioning for arrival of 700' Tanker this evening.

- Divers still fine tuning bedload bottle

1515 3 Tug boats offshore awaiting arrival of Tanker.

1520 Tanker offshore, but apparently not docking here til later, until after half load is dropped off upstream, contrary to expectations

1550 offsite for the day

End of Day

9-15-05 Thursday

0915 Onsite. Sign-In

Yardage: Tuesday = 940, Wednesday = 500

- Tanker onsite, with barges and transfer derrick positioned offsite. Sea Vulture onsite next cont. area.
- Divers working on silt curtain, anchors for
- Inspect area and shoreline. No problems.
- Hickey personnel not onsite.

1130 Depart site

Subsequent to departure:

- Fish "finding" performed by Anchor within 1° cont. area. No fish were found using portable unit.

End of Day

9-16-05 Friday Overcast, light rain

0820 Onsite. Sign-in. Barges, etc not yet back onsite. (expected ≈ 1200)
- Anchor collecting pre-dredge additional water samples (lab & ~~field~~) (Cn & PAH)
- Divers working on ~~bed load battle~~ anchors for the 2nd cont. removal area.

0840 On board w/ Anchor
- Collecting 3 depths at 6 stations, and mid-depth at 2 stations offshore from US Moorings (Fig D-3), downstream. Dibenzo furan also part of the analyses

1015 Received phone call from RP about dive safety: 2nd diver on board, decon, gloves. ⇒ Relayed concerns to Joe A and Mark Nicklas w/ Severson
- Spoke w/ Joe Burke about schedule. Not dredging today except for 2-3 buckets for demonstration purposes (NWN). -Not working Saturday, Dredging to resume Monday morning.

1140 offsite to get lunch.

1205 onsite. Transfer barge onsite
-Divers working on anchors

9-16-05 (cont.)
- H&S issues: Received word from Severson HSO that divers are and have been using impermeable gloves under work gloves
- Anchor collecting water quality (lab) samples offshore of US Moorings.
- Discussed w/ Joe A portions of the silt curtain that are submerged. He indicated that sediment from outside the 1° cont. area is sloughing onto the curtain and holding it down.

1510 Dredge bucket prepared to resume dredging

1515 Dredging
- Disembark to collect water quality measurements
- Flow direction upstream ⇒ Flip locations

"US"	±	EC	NTU	pH	DO
1'	18.90	84	5	7.33	9.12
21'	18.86	84	7	7.31	8.87
42'	18.87	84	9	7.30	8.79

9-16-05 (cont.)

"DS1"	±	EC	NTU	pH	DO
1'	18.87	84	10	>.38	9.13
6'	18.88	84	10	7.21	9.05
11'	18.88	84	10	7.30	9.03
"DS2"	18.74	84	10	7.36	9.22
	18.88	84	10	7.30	9.03
1548	18.89	84	10	7.28	8.96
"DS3"	18.90	84	9	7.28	9.12
	18.91	84	8	7.29	9.02
	18.91	84	8	7.30	8.99

1605 Onshore

1620 Offsite

End of Day

9-19-05 Monday clear skies

0830 Onsite. Sign-in. All barges onsite and positioned. Containment area secure.
- Divers onsite conducting inspection of silt curtain along B-E transect ⇒ discovered a ~~couple~~ tears along the transect and are putting some replacements in. Keeping existing curtain place and over-lapping replacement pieces.
- Hickey setting up barges.

0945 Anchor collecting pre-dredge field parameters
- A third, new, barge is onsite (GC-183).
- Divers working on anchors for outer removal area while awaiting arrival of additional silt curtain. E-D transect complete; working on B-C transect currently.
- Discharge water filter system in place on Sea Vulture derrick
- Barge onsite holds about 1,100 cu yd.

1030 Additional silt curtain onsite ⇒ switch from anchors to work on curtain.

1245 Additional curtain in place ⇒ back to placing anchors

1345 Anchor grabbing dredge material to conduct treatability testing w/ quick-lime and diatomaceous material.

9-19-05 (cont.)

1400 Hicks placing cement in barge prior to dredge material

1445 Dredging using clamshell bucket.
- Bucket ascending and descending at a slower rate, and, once out of water, moving to barge at a faster rate.

1530 Board sampling boat to collect field & lab water quality samples.

1545 Disembark. Reverse flow observed. 0.33 fps

		±	pH	EC	NTU	DO
"DS1"	~~US~~ 1'		18.75	7.57	97	2	9.85
	9'		17.98	7.32	94	4	8.95
1610 "DS2"	1'		18.04	7.29	92	4	9.21
	17'		17.94	7.28	92	4	9.06
34	33'		17.88	7.27	91	6	8.87

1633 Collect lab samples

"DS3"	1'	18.14	7.17	93	6	9.28
	21'	18.08	7.16	93	7	9.21
	41'	18.07	7.17	93	6	9.12
1646 "US"	1'	18.65	7.43	92	1	9.02
	23'	18.35	7.21	94	4	9.20
	45'	17.92	7.15	92	6	8.90

- Collecting additional lab samples

9.19.05 (cont.)

1710 Onshore. Still dredging. Observe dredging

1815 Dredging ceased. Yardage estimated @ ~500 cy

1830 Depart site

Jay
Erik

9-20-05 Tuesday scattered clouds

0815 Onsite. Sign-in. Revised yardage for Monday = 300-400 cu yd.

≈ 0845 Dredging commenced.

- Divers working on anchors for outer removal area

0945 Anchor on boat to collect water quality readings. Calibrated meters

- Repositioning barges.

Water Quality: Downriver flow @ 0.5 fps

	US	t	pH	EC	NTU	DO
0950	1'	17.77	7.21	88	5	9.07
	11'	17.75/.76	7.23/.24	88	6/6	9.01/9.01
	22'	17.74	7.25	88	6	8.97

1025 Onshore to get more bottles

1044 @ DS2. DS1 inaccessible (fuel barge)

DS2	1'	17.89	7.24	87	8	9.12
	23'	17.79	7.24	87	8	9.06
	45'	17.78	7.24	87	9	9.00

- Collect lab samples

1105

DS3	1'	17.87	7.26	87	~~8~~ 7	9.11
	23'	17.83	7.24	87	8	9.04
	45'	17.82	7.25	87	9	8.93

1110 Onshore. Several DEQ personnel onsite.

1130 Ceased dredging.

~~1140~~ 1220 Dredging.

1245 Anchor collecting visual sample from curtain-mudline interface.

9-20-05 (cont.)

1340 Anchor collecting 4-hour water quality readings & filter system influent & effluent samples for lab analysis

- Apprized by Tim Stone that today and tomorrow will be 8-hour days and that dredging will NOT be done Thursday & Friday.

1420 Depart site for office

End of Day

9-21-05 Wednesday clear skies, breezy

0845 Onsite. Sign-in
- Hickey transfering material onto barge.
- It's expected that barge #3 will be full early afternoon at which point dredging will cease for the day. A fourth barge (Chetco) is expected to arrive mid-day Thursday with dredging to start Friday morning. Apprized RM of such.
- Divers working on anchors, expected to be done today.

1030 EPA contingent offshore via tour boat.
- Hickey working on dewatering.
- Anchor experiencing difficulty with their field instruments ⇒ to go ashore to pick up materials and replacement

1047 left
1042 - Dredging

1139 Disembark for water quality readings

	±	pH	EC	NTU	DO
US:1'	17.95	7.32	96	4	9.24
8'	17.89	7.42	96	4	9,27
15	17.80	7.41	96	4	9,17

- 0.37 fps river current, outgoing
- Collecting upstream water samples for lab.
- Dredging stopped

9-21-05 (cont.)

1213	±	pH	EC	NTU	DO
DS3	lbs	17.81	7.37	91	5	9.14
	23'	17.73	7.30	97	7	9.08
	45'	17.73	7.17	96	7	9.04
1219						
DS2	lbs	17.77	7.32	96	8	9,20
	23'	17.74	7.30	97	8	9,15
	45'	17.73	7.17	96	10	9.06

1223 - Collecting samples for lab analysis
- DS1 obstructed by fuel barge.

1237 Onshore. Spoke w/ Joe B (Severson) about schedule. Shut-down Thursday for dredging and starting again on Friday morning.

1245 Anchor collecting filter system samples
- Observe activities

1330 Offsite for the day

Note
1500 Chetco barge left Boardman, per Schwarz
- 2nd Barge expected to arrive in Boardman at 10am Thursday.

End of Day

9-22-05 Thursday Boardman: clear skies calm

1045 arrive at offloading facility. Barge is being offloaded; Started at 0700 - Met w/ Anchor personnel. They stated the offloading process is very slow and could use some modification, such as doing away with the hopper and create a lay down area with loading trucks with a front end loader or such.

1300 Eight trucks thus far today, which equals a 30 cu yd/truck each/swinging ≈ 18 trucks each day. Each trucks holds about 30 cu yd.

1330 On boat to collect water quality readings

		NTU	DO	t	pH
TD=15.5	1'bs	2.01	8.69	19.28	7.97
DS1	8'bs	1.76	8.84	19.25	8.06
	14.5'	1.56	8.48	19.25	8.07
DS2	1'bs	1.98	8.77	19.21	7.98
TD=14.5	7.5'	1.83	8.56	19.18	8.06
	13.5	1.48	8.69	19.18	8.06
1354 DS3	1'bs	1.38	8.83	19.23	7.96
TD=25'	12.5'bs	1.63	~~8.07~~ 8.86 *	19.13	8.07
	24'	1.64	8.78	19.03	8.09

9.22.05 (cont.)

1403 US	NTU	DO	t	pH
TD=13.5 1'	1.64	8.87	19.27	7.99
7'	1.66	8.69	19.14	8.06
12.5'	1.55	8.77	19.02	8.10

1412 Onshore

1500 Total of 9 trucks thus far

1520 Offsite, depart for PDX

End of Day

9-23-05 Friday clear skies, breezy

0830 Onsite. Sign in. Dredging commenced ≈ 0800

0915 On boat to collect water quality readings
- Calibrating instrument
- Apparent reverse flow ⇒ measured using flow guage ⇒ 0.75 Fps. confirmed

		t	pH	EC	NTU	DO
0933						
"DS1"	1'	17.57	7.43	96	7	9.20
	6'	17.53	7.40	104	7	9.25
	12'	17.49	7.43	97	7	9.18
"DS2"	1'	17.59	7.37	129 119	7	9.23
	19'	17.51	7.35	115	7	9.16
	35'	17.51	7.32	110	8	9.11
1015 "DS3"	1'	17.54	7.35	88	2	9.12
	22'	17.49	7.21	105	6	9.14
	42'	17.51	7.18	112	8	9.10

- Collect lab samples

≈ 1005 Noticed bubble curtain is not on ⇒ Notified Tim Stone. (off ≈ 15 mins.)

1010 Bubble curtain back on

"US"	1'	17.55	7.33	90	5	9.12
1025	23'	17.49	7.32	105	6	9.01
	44'	17.49	7.15	99	5	8.93

1030- Collect lab samples

1045 Onshore

≈ Dredging paused for transfer dornicle to catch up.

9-23-05 (cont.)

1245 Collecting water quality readings

1240 Dredging
- Relate to Tim Stone need for additional sampling day silt curtain and at 8 sample points as on 9/16.

1300 Anchor collecting filter system samples.

1315 Dredging paused, while transfer catches up.

1400 Dredging

1435 EL rep. onsite

1444 Done dredging for the day
Continue to transfer and mix material until ≈ 1600

1500 - Spoke w/ Severson ⇒ Likely dredging Monday morning
- Offloading process is being modified ⇒ two containers (8'×28') side by side w/ spill plate and then loaded into trucks using excavator.

1545 Offsite for the day

End of Day

yardage = 700 cu yd

9-26-05 Monday clear skies, light breeze

0830 Onsite. Sign-in. Dredging commenced at 0800. Observe activities

0900 On-board to collect water quality readings. Calibrated instruments
- Discussed w/ Tim Stone dredging BMPs (overfilling bucket) and that we should speak again w/ Dredger.
- Divers onsite inspecting silt curtain

	±	EC	pH	NTU	DO
US 1'	16.83	112	7.28	7	9.21
10'	16.80	111	7.35	8	9.13
22'	16.79	110	7.28	8	9.06

- Collecting lab samples
- Substantial sheen on water surface
- Decon equipt and take Equipment rinsate
- No oil/sheen on anchor. Sheen/blebs not coming from containment area.
- Dredging ceased ≈ 0920

0953	±	EC	pH	NTU	DO
DS1 1'	16.86	107	7.30	10	9.25
21'	16.79	110	7.26	12	9.20
42'	16.79	113	7.20	15	9.08

- Fuel barge @ DS1 location

9-26-05 (cont.)

	±	pH	EC	NTU	DO
"DS2"	16.89	7.25	97	11	9.21
21'	16.79	7.27	111	14	9.14
42'	16.79	7.18	112	17	9.06

- Collect lab samples. NTU exceedances @ 21' & 42'

1014 Dredging US

1028 - Confirmatory NTU: 1' = 9, 15' = 8, 25' = 10

1035 Onshore. Dredging ceased = 1040 for 15' min
- Received word from RW that dredge is not to vigorously dunk bucket at end of day to clean it off. ⇒ Directed Anchor to relay message, and requested that the spill plate fabric be improved/widened

1110 - Spoke directly with Hickey personnel about ① dunking bucket, ② and confirming the limits of the dredge bucket and it being overfilled. Daryl indicated they would not do the vigorous dunking again

- offsite to get lunch

1140 Onsite. ~~not~~ dredging ceased.

1150 Noticed distressed fish w/in dredge prism. Asked Hickey to retrieve and notified Anchor (Tim Stone)

9-26-05 cont. (fish ≈ 4-5")

- Fish swam away upon attempt at retrieval. ⇒ Keeping watch. Notified RW.

1200 Third derrick onsite ("Sea Lion")

- Anchor preparing to collect samples near where distressed fish was spotted. (DO & total sulfides)

1215 Anchor noticed and retrieved a second fish. Then spotted a third, and fourth.

1220 collect samples from w/in dredge prism.

1250 Anchor has retrieved a total of 8 small fish, apparently sunfish & (1) crappie

DO readings:

- Inside dredge prism (near dolphin)

Inside	1'	8.3
	3'	8.65
	5'	8.85

~~Inside~~		Outside
~~Outside~~ silt curtain along pier	1'	9.84
	3'	9.75
	5'	9.20
~~Outside~~ Inside	Inside	
	1'	9.84
	3'	9.10
	5'	9.75

1320 Archaeologist onsite Todd Ogle w/ AEN

1325 Dredging along shoreline. Verbal approval to continue received from Nancy Munn (NOAA/NMFS)

1340 Anchor collecting water quality readings while I observe shoreline dredging. Slack tide ⇒

9-26-05 (cont.)

- Dredging along shore generates a sheen comprised of a more brown/product-like material floating on surface

		t	pH	EC	NTU	DO
1405	US 1'	17.41	7.33	135	6	9.32
	16'	16.98	7.25	110	8	9.22
1445	30'	16.97	7.23	110	9	9.21
	DS 1 1'	17.28	7.32	110	9	9.45
	17'	16.99	7.22	110	9	9.37
1430	34'	16.98	7.18	111	12	9.24
	DS 2 1'	17.20	7.31	109	6	9.42
	23'	17.01	7.27	109	10	9.33
1420	45'	17.01	7.20	109	11	9.20
	DS 3 1'	17.54	7.32	106	6	9.45
	23'	17.06	7.25	109	7	9.33
	45'	17.04	7.20	109	8	9.24

1450 Onshore. Observe dredging

1600 Head out to collect water quality readings. Current going out

9-26-05 (cont.)

1610	±	pH	EC	NTU	DO
US 1' bs	18.24	7.26	109	4	9.55
16'	16.93	7.17	107	7	9.21
33'	16.87	7.12	106	10	9.07

- Surveyor onsite to conduct bathymetry

1620 Advised by Tim Stone that there is a tear in the silt curtain along the A-B transect. Dredging stopped. Divers investigating.

- Tear is minor and is repaired/rectified by draping and anchoring fabric.

1630	±	pH	EC	NTU	DO
DS3 1'	17.15	7.19	109	9	9.35
23'	17.04	7.19	105	8	9.30
45'	17.02	7.19	107	8	9.22
DS2 1'	17.10	7.21	113	8	9.27
23'	17.03	7.21	107	8	9.30
44'	17.03	7.20	108	9	9.21
DS1 1'	17.21	7.18	107	20	9.22
17'	17.03	7.19	108	10	9.30
34'	17.08	7.15	107	15 ~~25~~	9.00

≈ 120' from tear in silt curtain ⇒ confirm ⇒ 12 NTU

1655 Onshore.

- Cumulative yardage = 6,230 yds

9-26-05 (cont.)

1730

- Received word from RCV that Anchor will be required to collect additional 8 samples as on 9-16-05, and along silt curtain (permeable section) inside and outside. ⇒ Told Tim Stone.

1750 Offsite for the day

End of Day

Photo from

9-27-05 Tuesday overcast, breezy

0830 Onsite. Sign-in.
- Transfer derrick active. No dredging yet.
- Hickey deploying oil sorbent boom
- Bubble curtain off: Severson working on it
- Spoke w/ RV re: sampling plan:
  1) 3 depths @ WCD1, WCD4 & WCU1 during dredging
  2) treatment system influent/effluent
  3) mid-depth along downstream silt curtain (permeable) during dredging
- Barge onsite likely full today. Expect next barge tomorrow afternoon (2-3pm)
- Archaeologist onsite
- Bubble curtain on.

1040 Repair of silt curtain complete and appears to be secure and effective.

1112 Dredging. Spoke again w/ Hickey regarding dredge technique and need to minimize overfilling.

1145 offsite to get lunch. Dredging

1215 onsite. Dredging stopped
= Volume dredged Monday (9-26) = 750 yd

1245 Dredging
- Advised by Hickey that next barge will arrive tomorrow night ⇒ dredging

9-27-05 (cont.)
Thursday morning

1300 Anchor collecting water samples (lab & field) per new direction from Malek (WCU1, WCD1, and WCD4) 9 samples total taking into account river current and "flipping" stations as appropriate. Collecting downstream samples
- Question as to whether silt curtain sample should also "flip" based on current direction ⇒ asked RV to clarify

1400 Dredging ceased after 15 min of pulling pylons

1420 Dredging
- Noted current appears to in slack mode ⇒ Anchor still in downstream locations

1435 Done dredging for the day

1440 Anchor collecting upstream samples
- Current actually still coming in

1515 Anchor onshore. Will collect silt-curtain samples at Point B inside & out.

1545 Depart site for the day.

End of day
Jared Watson

9-28-05 Wednesday clear skies

0900 Onsite - Sign in. Inspect site.
- Hicks working on haul barge prep. for transfer
- Discuss schedule w/ Joe B. Should be dredging Thursday morning.
- Yardage dredged Tuesday = 300 cu yd.
- Treatment system samples collected.
-

1100 Offsite.

End of Day

9-29-05 Thursday new barge onsite overcast

0830 Onsite. Sign in. Dredging commenced Archaeologist
- Observe activities, inspect site. onsite.

0730 Anchor collected by lab pre-dredge samples at three stations and along silt curtain inside and out. Completed before dredging commenced. Normal flow.
- Spoke w/ Tim Stone re: carbon filter. He indicated it should be coming in today and will be changed out ASAP

0957 Dixonbank to collect field parameters

1025 Flow: going out @ 0.53 fps

→ WCD1 was inaccessible (barge) this morning ⇒ sample collected at WCD2
- Technical difficulties w/ turbidity meter (Hydrolab) ⇒ Calibrated successfully but collecting additional readings w/ HACH unit.

1017	±	pH	EC	NTU HACH	DO
US1:	1'	16.62	7.24	126	4/3.73	9.31
	9'	16.62	7.23	113	4/4.04	9.32
	17'	16.50	7.23	105	5/4.59	9.21

- Collect lab samples and additional H2O for HACH NTU reading. Substantial sheen and surfacing in DS US1 location ⇒ move ≈ 20' Southeast (upstream).

1040 proceed to DS1 location.

9-29-05 (cont.)

1045	±	pH	EC	NTU (HACH)	DO
DS1	1'	16.59	7.26	102	6/5.59	9.41
	15'	16.55	7.25	107	6/5.56	9.32
	29'	16.54	7.22	108	6/5.31	9.25

1052 - Collecting lab samples. Duplicate sample collected @ D4

1105 Onshore to observe shoreline dredging while Anchor# continues to collect field and lab samples.

1120 Spoke w/ RW: He stated we should suggest Anchor put next carbon filter in series instead of change out so as to use up entirely first unit. -Tim Stone indicated he thought that was a good idea. Also stated he asked Mickey to use more sorbent and filtering mechanisms on the transfer barge prior to intake into pump.

- Observing shoreline dredging/excavation ⇒ thick sheen (darker) but no flowing product.

1148 Anchore onshore to collect silt-curtain samples close to Point B.

1215 Dredging paused. D1

1230 Offsite to get lunch

1315 Onsite. Dredging along shoreline (≈ 20 min pause)

9-29-05 (cont.)

1350 Anchor on boat to collect field readings
- Reverse flow conditions

1420 Proceed to shoreline excavation to take photos and inspect for flowing product. Observed a drip, apparently of product/water along southeast face of cut face ⇒ video captured & photos. Dripping could be water, hard to tell for sure, but is emanating from a moist very dark area along cut face.

1430 Dredging pause while survey marks dredge limits

1445 Spoke w/ RW: Directives from EPA
① - Silt curtain inspection every 3-days
② - Add 2nd carbon filter in series, at end
③ - then Add next one at end of series, (#2 → #1)
④ - Must tarp barges

1510 Dredging resumed.

1723 Dredging done for the day.
- Bathymetry survey

1800 Offsite

End of Day

9-30-05 Friday

0845 Onsite. Sign-in. Yardage Thursday = 825 cy raising
- New carbon filter onsite and in place; old filter plugged up (won't pass H_2O) and switched out entirely. Indicated ~~that~~ the series directive from EPA. Tim Stone not aware of that. Advised RW as to situation
- Working equipt around

1015 Dredging. Barge water pumped and discharged.

1110 - Anchor on boat to collect samples. Normal flow conditions

1140 Dredging paused to allow for water pumping.

1155 Dredging. Anchor having technical difficulties with field instruments. call from

1220 Received RW indicating that Anchor needs to put another carbon ~~unit~~ unit in series in order to meet requirements of EPA. (55 g drum or larger)
- Advised Tim Stone of such.

1420 Noticed the surveyors boat under water => Notified Hicley, dredging

1430 ceased to retrieve boat. Dredging was going to cease anyway

9-30-05 (cont'd)

- Divers coming in Saturday to work on
- Yardage today ≈ 500 cu yd.

1520 Spoke w/ Joe B. about divers inspecting curtains every 3-days

- Highest NTU reading downstream = 5
- Request additional oil sorbent in vicinity of shoreline dredge cut face => Task performed

1600 Offsite for the day

End of Day

Jon Stone

10-01-05 Saturday overcast

1100 Onsite to observe activities and take photos. Divers onsite placing bed-load baffle.
- Take photos of shoreline cut-face. Oil sorbent deployed as requested around cut-face. (still in place)
- Inspect site. No issues noted
- Severson working on / maintenance and fine tuning of bubble curtain.

1230 Offsite

End of Day

10-03-05 Monday partly cloudy

0830 Onsite. Sign-in.
- Divers onsite working on bed-load baffle.
- Hickey prepping equipment, re-positioning barges
- Anchor calibrating instruments (titration)

0944 Dredging. Archaeologist onsite.
- Divers inspect silt curtain

1000 Ken Cameron (DEQ) onsite to observe cut-face. Also showed Ken "orbody" along shore to the south, near wood platform.

1035 Anchor offshore to collect field and lab samples. Normal flow conditions.

1040 Ken Cameron offsite
- Divers replacing filter fabric around rear-th silt curtain along A-B transect.

1115 Spoke w/ RW about carbon unit (2nd) not yet being onsite. He stated no barge water should be treated until it is in place and that dredging should cease until it is in place if need be. ⇒ Advised Tim Stone of such. He said he would follow up.
- Anchor in downstream sampling location.

1158 Offsite to get lunch, dredging paused

1217 Onsite, Dredging.

10-3-05 (cont.) overcast, drizzle

1235 Anchor on pier collecting silt-curtain samples along A-B transect. Normal flow.
- Highest NTU reading in downstream location = 10 NTU.

1430 Anchor on boat to collect field water quality readings. Normal flow conditions.
- Spoke w/ James Wilson NWW (Director Internal Auditing). He solicited input regarding anything they can do to improve the project. I stated I felt more effort could be put into housekeeping (e.g.) oil sorbent deployment at end of day) to control/contain as much product/sheen as possible. He appreciated my feedback, and indicated he would type up an interim report. Advised RW of such.

1450 Received word from RW that transfer barge H_2O can be pumped today only w/ one unit of carbon, but the 2nd unit must be in place tomorrow. Advised Tim Stone & Bob Wyatt: Both already aware.

1530 Anchor onshore. Highest NTU = 8

1600 Done dredging for the day.

1615 Additional carbon filter onsite

10-3-05 (cont.)

1620 Directed Anchor to deploy / change out oil sorbent in various locations. Tim Stone indicated he would take care of it.
- Inspect site.

1715 Offsite for the day

End of Day

10-4-05 Tuesday overcast

0850 Onsite. Sign in.
- Hickey prepping for dredging
- Divers working on bed-load baffle w/ addl. barge derrick onsite. Baffle material onsite

0900 Dredging

- Deployment of oil-sorbent, per my request, looks good and effective.

0925 Dredging paused. Barge onsite is "full."
- Next barge is expected onsite at 1400, according to Severson. Transferring/mixing material on barge.
- Cloudy, partly sunny

1211 Dredging, to add more volume to barge onsite. Anticipate addl. dredging, once next barge is onsite, at 1600.

1250 Dredging paused

1315 On Sea Vulture to inspect/observe activities w/ Tim Stone. Tim collecting treatment system samples.

1400 Call from RW: 1) keep a diligent eye on the oil sorbent and necessary change outs 2) Draw diagram showing remaining tar body outside the dredge prism.
Next barge onsite, 8-10 offsite. ⇒

(GC-183)

10-4-05 (cont.)

repositioning barges, lubing buckets, and misc. prep tasks.

1500 On shoreline drafting schematic of remaining contiguous tar body outside of dredge prism.

1540 Dredging

1635 Anchor on boat to collect round of water quality readings and samples. Reverse flow conditions. Also will collect silt curtain samples

1640 Dredging ceased.
→ Per direction from Carl Stivers, samples were not collected. RW was notified by Carl of such
- Inspect site, photos

1730 Offsite

End of Day

Anita Upton

10-5-05 Wednesday overcast

0900 Onsite. Sign-in. Yardage Tuesday = 320 cu yd.
- Dredging commenced @ ~~0830~~ 0855
- Divers working on bed load baffle
- AIA Archaeologist onsite

0955 Anchor on boat collecting water quality readings and samples.
- Carl Stivers onsite. Discuss addl. dredging alongshore

1135 Dredging paused.

~~1200~~ 1145 Offsite to get lunch

1215 Onsite. Stivers meeting w/ Joe B and Daryl (Hilkey)
- Transferring material. Divers working on baffle
- Highest NTU reading today = 12. Bubble curtain was re-started just prior to collection of downstream readings. Normal flow conditions.

1245 Dredging

1300 Samples of treatment system collected

1415 Dredging paused to reposition barges

~1420 Anchor on boat to collect ~~samples~~ readings. Reverse flow.

1500 - Deploying oil sorbent

1533 Dredging (reverse flow)

1720 Anchor on boat to collect readings.

1730 Dredging done for the day.

10-5-05 (cont.)
- Observe clean-up. Barge almost full!

1745 - Bathymetry survey

1800 Offsite

End of Day

10-6-05 Thursday Overcast

0900 Onsite. Sign-in. Archaeologist onsite.
Dredging commenced @ ~0830. ceased ~ 0850
- Hilkey working on barge spud system (cable broke/tangled up). Divers working on silt curtain
- Yardage Wednesday = 730 cu yd
Yardage total = 10,455 cu yd dredge
- Call w/ RW: 1) current status on inner area
2) sequence of events as far pulling curtain's and moving into outer removal area. Hoping for slow release of inner area water.

1040 Dredging: grading along shore

1053 Dredging paused
- Anchor on boat to collect river velocity measurements. Normal flow conditions.

1110 Dredging

1135 Dredging paused

1156 - Dredging

10-6-05 (cont.)

1150 – Anchor collecting water quality samples. Normal flow conditions

1220 Dredging paused to reposition ~~barge~~ derrick for dredging of additional tar body ~~removal~~ outside dredge prism.

- Spoke w/ Joe B about sequence of events. He indicated the Sea Nature derrick, due to low tide, is not able to get into position for removal of addl. tar body. However the derrick will be able to reach the material when in position for outer removal area, such that the addl. material can be removed Friday/Saturday/Monday
- Also indicated removal of silt curtain in small sections will be very labor intensive (slow release of H_2O in containment area)

1330 Tarping barge. Observe activities
- Discussion w/ Joe B regarding ~~Fri~~ schedule.

1530 Tug onsite to remove barge.
- Look at bathymetry data
- Discuss schedule again w/ Joe B.

~~1630~~ Inspect site. Request ~~sorbent deployment~~ once bathymetry survey is done

1630 Offsite. End of Day

10-7-05 Friday overcast

0830 Onsite. sign-in. Inspect site and sorbent deployment. looks good.

0845 In position to remove addl. tar body outside dredge prism
- Dredging: removed 4 and a half bucket of material (≈ 35 yds)

0910 Done dredging.
Dredging yardage Thursday = 160 ca yds.
- Divers working on bed-load battle/partial length silt curtains

1015 – Sensed sheen/scum with sorbent and doing additional sorbent control

- Dewatering transfer barge will occur today w/ samples collected.

10-8-05 Saturday overcast Mark

0845 Onsite. Sign-in. Tim Stone onsite. Marcus

- Divers onsite, working on partial length curtain along O-C transect, and bed-load bottle

0850 Dredging. sorbents deployed in advance

- Fine-grading based on bathymetry from 10-6-05

Will need to pump H2O ⇒

0942 Done dredging. Anchor collecting samples.

- Divers working on curtain rest of day

1045 Offsite

End of Day

10-9-05 Sunday partly cloudy

1100 Onsite. & Sign-in.

- Inspect site. Sorbents deployed.
- Tim Stone and Marcus onsite.
- Divers working on partial-length silt curtain along O-C transect

1215 Walk shoreline. photos. No problems with curtain and sorbents. Everything in place

1230 Depart site

End of Day

10-10-05 Monday — high overcast

1000 Onsite. Sign in.

- Fuel tanker departed at 0815 today
- Divers working on outer containment: B-C transect should be in by end of day.
- Whole complete, new treatment system onsite ⇒ 2 complete systems, and a 5th carbon vessel.
- Latest schedule has the outer containment done today and a partial opening of the inner silt curtain this evening to allow for a 12-hr slow release of water.

1200 Offsite

End of Day

10-11-05 Tuesday — scattered clouds

0930 Onsite. Sign-in.

- Two dive teams, working curtains at points B & E
- Anchor on boat collecting baseline/background field & lab samples
- Inner curtain has been open at points B & E since last night. Yet to remove any inner curtain. Material barge and Seahawk outside can are
- Joe B says clay mat for shore should be here on the 21st

1100 Divers cutting anchor tiedowns on silt curtain at mud-line. With chain still in place, curtains not technically removed yet ⇒ Will collect samples 1-1.5 hours after physically removed.

1215 Offsite for lunch

1245 Onsite. Repositioning barges (material barge, Seahawk second derrick) into outer containment area began partial length silt curtain

1400 ~~1300~~ AM Divers preparing to cut-out sections of inner silt curtain.

1430 Offsite for the Day

End of Day

10-12-05 Wednesday overcast

0900 Onsite. Sign-in

- Spoke w/ Joe B. He indicated that the bubble curtain is impacting the partial-length curtain, forcing the float portion to submerge and compromise the containment. Sean Sheldrake notified and approval received to shut down bubble curtain for sake of dredging asap. RW indicated maybe a way of draping something over the bubble curtain in areas of impact. Suggested this to Joe B.

- All barges in position and ready to dredge. Need to deploy sorbent in inner containment area.

- Dredge equipped w/ environmental bucket.

1045 Deploying sorbent around perimeter.

- RW indicated downstream sampling should be at 150' and 600' downstream, based on recent water quality exceedances.

≈ 1130 Dredging

1230 Dredging paused. Contractors access curtain (on both ends) is surfacing, apparently tiedowns are too loose. ⇒ Attempting to resolve. Need to move barges upriver to allow divers to gain access.

10-12-05 (cont.) overcast

1255 Anchor on boat to collect samples. Samples "downstream" will be collected at 150' & 600' downstream. Currently experiencing reverse flow conditions.

1430 Dredging. Divers placing additional chain at bottom of "contractors access" to keep it hanging down.

- Anchor onshore. Highest NTU = 8

1520 Dredging paused to switch buckets.

1535 Anchor collecting silt-curtain samples. Environmental bucket coming up partially full w/ a lot of water. Also need to move 1 barge so it doesn't get stuck on the bottom.

1620 Resting barges.

1630 Anchor on boat collecting field water quality readings

1645 Dredging w/ other bucket.

1735 Offsite for the day. Still dredging.

End of Day

10-13-05 Thursday — drizzle overcast

0900 Onsite. Sign-in. Inspect site: looks good
- Dredging: ≈0800. Bubble curtain off
- Yardage Wednesday = 650 cu yd
- Divers working on curtain.
- Anchor on boat collecting samples (field & lab). Highest NTU = 4. normal flow
1210 Anchor on boat collecting field samples. slack tide low ⇒ downriver = downcurrent
Highest NTU = 4
1450 ~~1500~~ # Dredging paused for bathymetry survey
1600 Dredging slack tide ~~normal flow~~
- Anchor on boat to collect readings
- Anchor collected treatment system samples, but 2nd set samples were collected from 1st carbon unit since second one was being switched out at time of sampling (trying to make it for courier).
Highest NTU = 8 upstream by barge
downstream NTU = 4.
→ Fueling barge in position
- Plan on dredging until 1800. Addl. sorbent to be deployed.
1730 offsite.

End of Day

10-14-05 Friday — clear skies

0810 Onsite. Signin. Inspect site: new sorbent deployed. Looks secure
- Yardage Thursday = 1039 cu yd.
0958 Dredging.
1100 Anchor collecting ~~treatment system~~ samples
1115 Anchor on boat to collect lab & field samples. Normal flow conditions.
- Joe B. indicated they have received approval to remove the bubble curtain, and the curtain & bottle once the pilot cap is in place.
1155 Dredging paused. Barge onsite is full (Chetco
1205 Offsite to get lunch
1230 Onsite. EI rep (Craig Christian) onsite, observing from cat-walk.
- Pumping barge water, and mixing dredge water
→ Highest NTU downstream = 4
1340 Dredging. Tarping Chetco barge.
1410 Noticed dredge operator checking for high spots w/ bucket ⇒ notified Rick Schwarz of such and he directed Hickey to cease practice. EI rep. also noticed ~~practice~~ it and asked if that was typical. I stated it was the first

10·14·05 (cont.) overcast

1415 Dredging paused (Done for the day)
255 cu yds today

≈1540- EI Rep departs site.

1550- Received call from RW: EI called Scan Shellrite to point out gap in contractors access gate that occurs when reverse flow conditions exist, allowing flow of water into containment area. Effect is not observed when normal flow conditions are occurring.

⇒ Hilley/Scranton will drape some chain vertically on either side of gap with some connections between the two chains below water at various depths.

1700 Next barge in position (B-10). Full barge offsite.
- Hilley will transfer remaining material to B-10 and pump barge water

1730 Depart site.

End of Day

10·15·05 Saturday mostly cloudy

1000 Onsite. Sign-in. Inspect site: no issues
- Dredging @ ≈ 0810
- Anchor collecting field & lab samples: Normal river flow, Low NTU.
- Contractors access gate has weights ~~+ c~~ at chain draped over edges of "gap." ~~but~~ With current river flow being normal, the gate does not have a visible gap.

1100 Anchor collecting treatment system samples.

1230 Dredging paused for bathymetry survey

1320 Dredging resumed
- Anchor on boat to collect water quality readings. Reverse flow. High NTU <8

1400 Depart site for the day. Dredging upon departure.

End of Day

10-16-05 Sunday overcast

1000 Onsite. Sign-in. Dredging at ~0800
- Talk w/ Joe B: should be done dredging ~1200. Looked at bathymetry and only a couple high spots remaining, and fine grading around pylons.
- 950 cu yd Saturday
- Anchor back from collecting samples. Normal flow. Highest NTU = 8
- Anchor on barge collecting treatment system samples.
- Inspect site: looks good, everything in place.

1210 - Requested some additional sorbent in northeast corner of containment area (by contractors access gate).
⇒ 1220 Sorbent deployed as requested
~~1235 Done dredging.~~ ** Bathymetry survey for Monday am. — actually absent an hour more ⇒ Anchor to collect another round of readings
~~1300~~ 1330 ** Depart site.

End of Day

10-17-05 Monday

1000 onsite. Sign-in. Site secure. ~0830-0745
- Fine grading dredging thus far today.
- 14,160 = cumulative yardage
- Anchor on boat collecting samples. Normal river flow. High NTU = 11 (at bottom)

1030 Dredge in water. (fine dredging). 1 bucket only
- Discussion w/ RW re: increase in offsets around pylons (15' → 35'). I inquired as to the official submittal/approval for the change. RW asked me to inquire w/ Anchor as to what process they undertook for gaining approval ⇒
— 1100 Tim Stone indicated the offset change was submitted directly to EPA (Sean Sheldrake).

- Transferring material and pumping barge water ⇒ Anchor to collect treatment system samples.

1215 Surveyor onsite for bathymetry survey.

1330 e-mailed RW photo of contractors gate during reverse flow. Also, left message about the logistics of locking/unlocking the gate during the placement of the

10-17-05 (cont.)
pilot cap. Joe B. stated capping would take a day and a half (at most) and that lacing/unlacing would likely take 1.5-2 hrs each time,

1500 spoke w/ RW: 1) ok to pull stakes today
2) need to rectify any gap in the contractors gate should it occur
3) ok to do grab samples after dredging based on todays bathymetry,

1520 Hurley working on contractors access gate:

1550 On RSS boat (Eric Parker) to retrieve/measure sediment stakes,
- Measurement method: diver will place a second zip-tie at mud line, pull stake and the measure the distance between the two zip-ties.

1650 Diver unable to locate 1st sed. stake; on 3 spud holes in area, potentially having impacted stake tether. Not enough day light to attempt another dive ⇒ will try in the morning.

1715 Dredging, based on todays' bathymetry

1820 Anchor on boat to collect readings. Normal flow.

10-17-05 (cont.)

1900 Depart site. still dredging.

End of Day

cumulative - 14,360

10-18-05 Tuesday overcast

0900 Onsite. Sign in. Fine dredging w/ enviro. bucket, started @ ≈ 0715. 50-60 yds Monday
- Anchor on boat collecting samples. Normal flow conditions.
- Severson dismantling bubble curtain manifold.
- 3rd party survey ≈ 1200
- Severson requested I ascertain the expected turn-around time on approval of bathymetry data ⇒ let msg. w/ RW.

1040 Conf. call w/ RW & Joe B to discuss bathymetry data and areas of concern.

1100 Observing dredging: noted material being removed at final grade (≈ -34.5) appears to be visually contaminated, and sheen is still resulting from the dredge process.

1105 Dredging paused

1115 3rd party surveyor onsite.

1215 Surveying whole inner containment.

10-18-05 (cont.) Dredged Tuesday 440 yds

1245 offsite to get lunch

1310 Onsite. Surveying

1435 Anchor collecting treatment system samples

1455 Diver (RSS) onsite to attempt sed stake retrieval. Surveyor not done yet.

- Anchor preparing to collect sed. grab samples

1515 - Surveyor done. Diver preparing to get in water.

1540 Diver in water

1620 Diver unable to locate sed. stakes

1705 - On boat, in position for PD06

-equipment decomed

1735 PD06 obtained: visually contaminated blebs petroleum brown, slightly sandy (m-g) silt, heavy odor, full 17" penetration. visual contamination appears to be limited to surface of sample (~1cm)

1815 ~~1755~~ PD12 obtained, silty sand, dk. brn, visually contaminated, chunks of blk tar body (<2"), brown 4" clast of silty clay, heavy sheen throughout (oily substance)

1840 Onshore

1850 Depart site.

Cumulative yardage = 14,800

End of Day

10-19-05 Wednesday overcast, lt. ra

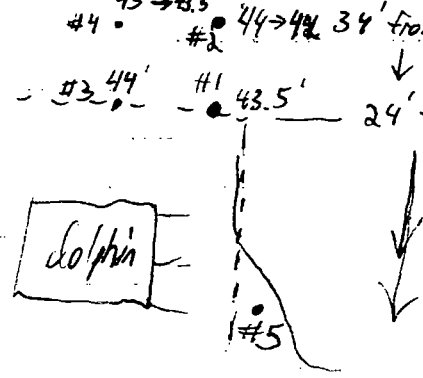
0900 Onsite. Sign-in.

- Discuss w/ RW areas of necessary additional dredging based on 3rd party bathymetry ⇒ 3 locations: 1) North of large offset (protected area) 2) toe of A-A' transect, and 3) very small hump along E-E transect

0945 On barge to discuss w/ Hilcorp means of verifying final depth (lead line), and from where dredger will be taking buckets around offset.

1010 on skiff to verify depths at offset (#1). Hilcorp using lead line

- Depth @ 24' from toe is 43.5' w/ tide gauge at 9'.
- Depth @ 34' from toe is 44, but 2' east is ~42 ⇒ addl. bucket ⇒ Re-check w/ lead line ⇒ 44.4', but 43' @ 34' from toe. ⇒ addl. bucket



10-19-05 (cont.) (#4)

43' depth at 34' from toe ⇒ 43.5'

- ~~Clk~~ Dredging along A-A' transect at toe to remove hump where toe meets offset

1040 pulling bucket from along A-A' transect bucket (10' x 20') ⇒ Lead line = 39.5 @ pt #5

1100 pulling bucket from pt. #6 on outside of toe ⇒ lead line = 43.2 w/ 8.7 on staff guage ⇒ 34.5

1145 dredging along E-E' transect. 1 bucket Lead line = 43.7 staff guage = 8.6 20' off dredge prism, 35' ⇒ 35.1

1155 - Done w/ lead lines & dredging

1200 Onshore

1215 Relayed results to RW (of lead lines) and discussed day mat, and desire to have it "keyed in" to native material

- Divers have been onsite as of this morning, working on curtain. An anchor was pulled tight last night. Also cutting bubble curtain pipe into sections. Also working on ~~prepping~~ contractor gate.

10-19-05 (cont.)

- Another has been collecting sediment samples since this morning.

1500 Last sediment sample collected.

1545 Last haul barge offsite w/ material (cement barge

1615 - check in w/ RW

1630 Depart site

Dredged 100 yd. Wednesday

End of Day

Cumulative yardage

14,900 yds

10-20-05 Thursday — light rain overcast

0900 Onsite Sign-in.
- Opening contractor gate to move capping material barge into inner cont. area. (Divers onsite)

1045 1010 - Close contractor gate once material barge is in place w/in inner containment

1130 Contractor gate closed/secure.
- Treatment system dismantled.
- Spoke w/ Daryl (Hickey) and Joe B about application rate of capping material: Indicated some buckets will be spread on the barge to ascertain how far bucket needs to be opened and corresponing application rate, and that the thickness of cap results.

1200 Hickey taking lead line measurements prior to placement of material, for trial.

1201 - First bucket in water. Bucket taken to bottom, then raised a foot, then opened slightly while bucket is moved side to side.

1206 Hickey taking lead line measurements to determine thickness of deposited material.
⇒ Commence capping. Starting at the "toe" of the dredge prism slope. and proceeding shorewards.

10-20-05 (cont.)
- Discussed w/ Joe B the desire to have bottom edge of organo-clay mat "keyed" to native material. He referred to the difficulty (potential) in tapering out lift material w/ precision, but would discuss it w/ Hickey.

- Anchor collecting water quality samples 1330 1st round ~1630 2nd round
2 sets of readings. Highest Normal flow first round
- Relayed to RW cumulative yardage. (14,900)

- Survey tomorrow, some Fringe material also Mat on Saturday.
- Working to 1700 today.

- Highest NTU @ D3 19, 17, on bottom
⇒ ~50 feet downstream from oil boom
highest NTU = 13

1615 - Spoke w/ RW: asked me to assess weather reducing fringe cap placement to the 10' high water mark would result in leaving exposed material ⇒ took several photos, with tide guage at: 7.5'

1645 Offsite

End of Day

10-21-05 Friday — Foggy

0800 Onsite. Sign-in. @ 432
- Capping.. ~~480~~ yds placed yesterday
- Inspect site: Seawe, requested some additional sorbent vrest edge of containment
1015 Anchor on boat to collect samples.
1045 - Sorbent being deployed along perimeter.
- Spoke w/ Joe Bi: next barge of 300 yds of pilot cap capectal @ 1230, then will be done w/ pilot cap once that is in place (pending bathymetry).
- Will be removing silt curtain once pilot cap is complete.
- Divers have been onsite demobing the bubble curtain (removing sand bags, etc.),
1130 EI rep onsite. (Aaron Barack)
1140 Seahawk derrick offsite. Clear skies.
- capping paused until arrival of next barge
- Bathymetry survey in capped area
1200 EI rep. offsite, likely returning later today.
- Highest NTU downstream 17-23 @ D1
1305 2nd barge (mixed load) onsite.
1420 Capping (pilot)
1455 Capping paused for additional survey (all slope dredge prism areas covered)

10-21-05 (cont.) — clear skies

⇒ Bathymetry data from am does not look good: inconsistent and some are ~~show areas~~ deeper than the original grade ⇒ Resurvey and use some manual methods to determ. grade. (Diver, lead line)
1520 Moving derrick out of dredge prism to enable another survey.
1540 EI rep (AB) onsite. (no capping currently)
1620 Moving derrick ~~back into position.~~ to give room for diver. Diver is doing spot checks to determine thickness of cap in ~~tracking~~ grid locations (every 10' on transects over whole dredge prism on slope)

1700 2nd Survey in and looks good, and correlates w/ the manual readings produced by the divers. Surveyor will produce a plan view showing low areas for dredge personnel
1800 Offsite.

End of Day

10-22-05 Saturday

1100 Onsite. Walk site: secure. Sign-in.
- Survey completed after placing material in low areas based on yesterday evenings bathymetry data. All pilot cap material has been placed.
- Anchor has collected first round of field and lab samples.
- Note very little sheen in containment area.
- Divers are working on removing contractors gate.

1140 pulling silt curtain gate.

1245 pulling next section of silt curtain. will pull another section then do some bubble curtain sections.

1300 Anchor on boat to collect next round of parameters.
- Expecting clay mat later today (~1600) and plan on placing it Sunday morning.

1340 - removing next piece of curtain.

1400 Depart site for the day.

End of Day

10-23-05 Sunday overcast

0900 Onsite. Sign-in. Site secure.
- Cut face area of dredge prism has been prepared for clay mat placement. Sand (capping material) plowed up the shore and roked smooth.
- Half of the silt curtain has been removed.
- Preparing clay mat and iron I-bea that will be used as a spreader.

0945 Soaking mat
- Placement of sand involved an attempt at leaving a swath of exposed native mate parallel to the shore along the whole cut face: bottom edge of mat is expected to rest w/in the swath such that it is keyed in to native sads.

1010 West edge of mat staked ⇒ rolling it out.
- placing sand bags & rip-rap on top of m
- Pilot cap is ~~1400~~ 1,200 LT tons plus (200 addl. tons Fringemat

1130 Done placing mat.
- Divers pulling bed-load bottle, and thereby placing more fringe material over mat. - Anchor collecting samp

1300 Depart site

End of Day

10-24-05 Monday — overcast, foggy clearing

1100 Onsite. Sign-in
- Capping w/ fringe material
- Divers removing curtain/baffle
- Bathymetry survey
- Additional fringe material on shore
- Anchor on boat earlier collecting samples
~~- Pilot cap: 75'~~
- Request sorbent be positioned along outer curt.

1200 Anchor on boat collecting samples.
- Hickey repositioning sorbent along outer containment. Very little sheen along shore and in dredge prism.

1245 Spoke w/ Joe B. about west edge of shoreline fringe material: placement appears to have come up short of 10' high water mark. He indicated they would place more material when they are putting down armor material.

1400 Depart site.

End of Day

10-25-05 Tuesday — mostly cloudy

0930 Onsite. Sign-in
- Anchor on boat collecting samples
- Divers removing bubble curtain
- Hickey placing armor material along shore
Placed additional fringe and armor material in area outside dredge prism to the east along shores edge (where extra turbidity material was removed).

1300 Depart site for the day

End of Day

10-26-05 Wednesday — drizzle overcast

0900 Onsite. Sign in.

~~Fringe Material placed~~ armor material 600 ton

quarry spall 160 ton rip-rap

- Some extra armor and quarry spall placed under cat walk at west end of shore line cut face.
- Anchor on boat collecting samples.
- Estimated completion date: Oct. 30th
- ~~Final~~ Next barge of fringe material expected today.
- Bathymetry survey

0950 ~~Final~~ Next barge onsite.

- Continued capping

1200 Offsite for the day

End of Day

10-27-05 Thursday — mostly sunny

1000 Onsite. Sign-in.

- Capping. Anchor on boat being collecting ~~surveys~~ currently.

1100 - Bathymetry survey performed ~~this am~~

1115 - Anchor off boat with samples

- Observe capping

1300 Offsite for the day

End of Day

10-29-05 Saturday partly cloudy

1000 Onsite Sign in.

- Capping w/ fringe material
- Anchor collecting samples
- Bathymetry survey will occur this afternoon.
- Requested outer boom be closed as froth from cap placement is flowing down river.

11-10-05 Thursday

- Visit to transfer facility in Boardman to observe demobilization activities
- Site is clean and no evidence of spillage around transfer equipment
- H&S equipment looks good: tyvec splash guards, gloves, etc...

11-11-05 Friday

- at offloading facility, observing demob. activities
- Effective steam cleaning of equip. inside barge, water pumped out of barge into Vac-truck.
- Anchor collecting soil samples x 2 locations

GATSCO 9.14.05

0845 ARRIVE ON SITE AT PORT OF MORROW - CHECK IN - MEET WITH WASTE MANAGEMENT (WM)

0905 Drive to unloading site - MEET with Rick Schwarz and Steve Harqual

0910 According to Mark Wells of WM the sediment contains too much water. They have instructed operations in Portland to fix (add more cement) - Not adding Cement on site

NOTE: BEGAN LOADING 1st TRUCK AT 8AM - NOW Complete - 90 minutes Loading time

NOTE: TIDEWATER did not want REAGENT MIXED ON SITE - WM will take wet sediment - possibly extra $50/ton

NOTE: Barge will rise as it is un-loaded bringing it closer to the spillplate - Rick Schwarz will ask if VISQUEEN can COVER the gap between spill plate and barge

0947 Loading stopped - Truck being loaded is leaking out back under hopper - Cannot go on Road

1019 CLEANUP IN PROCESS

9.14.05 GATSCO

1035 Got word from WM and Rick Schwarz of Anchor that the sediment is too wet to transport. Unloading ceased for time being.

1138 ANCHOR ENVIRONMENTAL TO TAKE SAMPLES FROM BARGE - For testing at Arlington

1205 In boat with ANCHOR personell For water quality testing - 2 sampling points - buoys

* 3 depths 1 bus, ~~8'~~ bus, 1 foot off bottom (bottom depths ~ 15-16')

DO
TEMP } YSI
PH

Turbidity - HACH Turbometer

ANCHOR PERSONELL:
STEVE HARQUAL
CRAIG WELLS

1325 ARRIVE @ MARINA WEST of PORT LOADING ANCHOR'S BOAT

1327 CALL from Rick W RE: possible leak @ barge

1342 BACK ON SITE - LEAKING WATER WAS from BULKHEAD - NOT WASTE

NOTE: Rick Schwarz took 6 samples from barge (all approx 10"-24") deep

1402 Spoke with Pat Hensar of Tidewater. Leak was from inside the barge - No sheen on water surface. The leak has been plugged and EPA informed Tidewater that NO water sample was necessary as no sheen was apparent.

1503 Spoke to Rick Schwarz and Mark Wells about Spill contingency. Booms and absorbants on site. Rick Schwarz noted that the material is so hydrophobic he'd be suprised to see anything in the water.

1507 LEAKING TRUCK has been sealed and is going take remaing load to ARLINGTON

1507 REBARING TRUCK Before it goes to landfill LEAVING SITE.

APPENDIX B

Daily E-Mail Project Updates

Daily E-mail Update: 8/24/05

Sean/All,

This is the first of daily emails regarding the Gasco removal action oversight. Please email me if you do not want to be included in further emails. Typically, I will send out a brief summary of actions/issues and include a couple of photographs. Additional photographs can be found on the Parametrix FTP site. Access to the FTP site:
1) log on to Parametrix.com
2) Click on FTP, click on accept agreement
3) Username: Client Password: Service
4) Click on Public, click on EPA, click on Gasco

8/24/05 Field Oversight Update
Andrew Somes - Parametrix Field Staff

A Health and Safety meeting was conducted at 7 am. Overall, the crew (Anchor, Hickey, Sevenson) was working in a professional, safe, diligent and conscientious manner. No issues were identified.

Tasks performed:

- Continued placement of anchors along the inner containment area transect, points F to B (approximately 80% complete). This operation was performed in what appeared to be a very diligent and smooth operation. Sevenson has stationed a professional diver of theirs on the beach (Joe Adamason) who observed the whole days activities. He is their QA/QC guy who will be inspecting the silt curtains and such upon completion. The anchors appear to be meeting the 25-foot spacing specification.

- Staging of air compressors, air filter and piping for the bubble curtain.

- Staging of work trailers, health and safety equipment, and various job site equipment.

Some photos are attached (Hickey placing anchors, barge and derrick, inner transect). The rest of todays photos are in the Public folder one the ftp site.

Rick Wadsworth, P.E.
Parametrix, Inc.
(503) 233-2400

Daily E-mail Update: 8/25/05

Sean/All,
8/25/05 Field Oversight Update
Andrew Somes - Parametrix Field Staff

Activities performed:

- Pull test of anchors to meet specified strength. Discussion occurred as to refining the specified strength (15,000 lbs). Anchor/Sevenson/curtain designer have revised the required strength per designers specs and will be submitting a revision to EPA.

- Continued placement of anchors along the inner containment area transect, points F to B (approximately 85% complete). This activity appears to be going slower than expected so the crew may be working Saturday.

- Partial deployment of silt curtain (not unfurled) between points F and E (photo attached).

- Continued staging of air compressors, air filter and piping for the bubble curtain. Assembly complete halfway down the shoreline (photo attached).

- Staging of work trailers, health and safety equipment, and various job site equipment.

Issues/Schedule:

No signficant issues were identified. NWN to submit modified anchor design strength to EPA. At this early stage, the schedule appears to be on track (e.g. dredging to start 9/6/05).

Some photos are attached. The rest of todays photos are in the Public folder on the FTP site.

Daily E-mail Update: 8/26/05 and 8/27/05

Sean/All,

Gasco Field Update 8/26 and 8/27
Andrew Somes - Parametrix Field Staff

All activities conducted safely, with anchor placement conducted under close supervision of Sevenson diver, and Andrew Somes (PMX). No significant issues identified.

Activities performed:

8-26-05 Friday
- Continued placement of anchors along the B-F transect. The B end of the transect brings the silt curtain, as designed, inside the bumper/piers, so as to avoid contact with any fueling vessels; none are expected but the placement ensures room for docking. The end point B was reached by the end of the day.

8-27-05 Saturday
- Placement of anchors along the B-A transect to the shore north of the tar body.

- Pull tests of some anchors along B-A transect.

- Surveying contractor conducting bathymentric surveys

Notes: 4 previously unanticipated submerged pilings were encountered along the A-B transect, and will be trimmed and hauled.

Photo from Friday shows progress as of 3 pm.
Second photo shows sheen at very low tide.
Third photo shows Northwest Underwater (Hickeys contractor) working along B-A transect.

Remainder of photos on the FTP site.

Schedule: At this time, the schedule has not been affected. 9/6 expected start of dredging.

Daily E-mail Update: 8/29/05

Sean/All,

Gasco Field Update 8/29/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Trimming of submersed pilings that were in the way of silt curtain deployment along transect A-B.

- Staging of both permeable and impermeable silt curtains along barge in preparation for deployment.

- Placement of buoys for bed-load baffle.

- Moving of FAMM fueling oil boom such that it would not interfere with placement of silt curtain along A-B transect. This activity also required moving one of the trimmed pylons.

Issues Identified:

Moving of the FAMM fueling oil boom, which took place in shallow waters, resulted in one of the boats churning up a substantial sheen. Sevensen enacted a rapid and effective deployment of oil sorbent booms and oil containment boom around the sheen, and completed some mopping with sorbent pads. Pictures of the sheen and boom deployment are attached.

Schedule:

No issues to report at this time.

Daily E-mail Update: 8/30/05

Sean/All,

Gasco Field Update 8/30/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Placement of permeable silt curtain along transect A-B (unfurled).

- Deployment of southern stretch of bubble curtain, from shore to northwest point of outside containment area. Task also involved placement by diver of sand bags over "legs" of curtain.

Issues Identified:

None.

Schedule:

Possible impact to schedule due to background field water quality issues, and the need for further data collection.

Relevant pictures attached, the remaining pictures posted on the PMX FTP site.

Daily E-mail Update: 8/31/05
Sean/All,

Gasco Field Update 8/31/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued deployment of bubble curtain along river-side edge of outer containment area, turning the corner and back to shore. In addition, placement by diver of sand bags over "legs" of curtain. This task was expedited today by the use of two separate dive teams, one placing bubble curtain piping and the other placing sand bags.

Issues Identified:

None at this time.

Schedule:

Additional background water quality sampling will be conducted Thurs/Friday. Dependent on results and discussions with EPA/DEQ, there is potential that this could delay dredging schedule by 1-2 days (scheduled to start 9/6).

One picture of activities attached; the remainder of the pictures are located on the PMX FTP site.

Daily E-mail Update: 9/01/05

Sean/All,

Gasco Field Update 9/01/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued deployment of bubble curtain to shore and final connection made, with continued placement of sand bags over "legs" of curtain.

- Placement of concrete block anchors used to secure bedload baffle within outer containment area. Preparation for the deployment of baffle depending on the strength of the current (tide inflow). Concern existed as to difficulty in placing baffle with strong currents.

- Additional collection of background field water quality parameters, with John Malek and DEQ representative present. DO readings were noticably higher than previous readings, per brief conversation with John Malek.

Issues Identified:

Continued background water quality sampling will occur 9/2/05.

Schedule:

Conversations with Sevenson indicated that everything is on schedule. Dredging to be initiated late day 9/6/05.

Pictures from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/2/05

Sean/All,

Gasco Field Update 9/02/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Complete deployment of bed-load baffle.

- Additional collection of background field water quality parameters with Andrew Somes present.

- Inspection and additional securing of bubble curtain, with possible hour-long test dependent on available time at end of day.

Issues Identified:

No issues identified at this time.

Schedule:

Currently on schedule for dreging start on 9/6/05

Pictures from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/03/05

Sean/All,

Gasco Field Update 9/03/05
No Parametrix Field Staff - decision to work Saturday made at 1900 Friday.

Activities Conducted:

- Deployment and tie-back of silt curtain.
- Four hour test of bubble curtain. One connection needed attention (removal of gasket and alternative bolts, with success)

Daily E-mail Update: 9/06/05

Sean/All,

Gasco Field Update 9/06/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Additional/final connections made on silt curtain.

- Seining of fish within inner containment area. Fish captured included: 94 shad, 2 starry flounders, 45 small-mouth bass, 1 large-mouth bass, 19 perch, 1 larval shrimp, 1 crayfish and 1 sculpin. No endangered fish observed.

- Activation of bubble curtain. Bubbles are making it around the whole perimeter.

- Arrival and staging of transfer barge and second derrick. Drying barge and haul barge are expected at 0800 on 9/7/05.

- Deployment of oil absorbent boom in inner containment area.

- Deployment of additional oil boom around primary derrick to prevent it from oily sheens, etc.

Issues Identified:

Slight schedule delay; see below

Schedule:

No dredging activities ocurred on 9/6/05, due to final connections/check of containment system and late arriving barges. Barges are expected by 0800 Wednesday, with a couple of hours allowed for positioning, spill plate construction, and final deployment of oil boom around outer containment area. Initial dredge activities should occur around mid-day Wednesday.

Two pictures attached from todays activities; the remaining pictures are located on the PMX FTP site.

Daily E-mail Update: 9/07/05

Sean/All,

Gasco Field Update 9/07/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Arrival and positioning of drying and haul barges. Both barges equipped with spill plates that, upon commencement of dredging, functioned well at controlling drippings.

- Additional positioning of outer oil boom

- Additional fine tuning of silt curtain by divers.

- Placement of sediment traps prior to commencement of dredging.

- Commencement of dredging at 1350. Various photos taken along with two "video" (*.avi) files showing bucket action. Material dredged appeared to be comprised primarily of contaminated sediments; dredging was initiated at the southern edge of the dredge prism. Buckets, once raised above water surface, were hung in place for approximately 1 minute prior to placement in transfer barge to allow for drippings/water to fall out, then placed in barge. Water accumulation in transfer barge is low; no dewatering necessary today. Initial estimates put volume removed somewhere between 800 and 900 cubic yards, in 5.5 hours.

- Collection of upstream and downstream field water quality parameters and lab samples with Andrew Somes present. Turbidity readings were somewhat elevated in the downstream locations, reaching up to 19 NTU. Wind and waves were strong at time of dredging, which has the potential to contribute to shoreline turbidity. John Malek was immediately notified by Anchor personnel of the turbidity exceedances; He suggested continued normal collection of measurements, and additional measurements in and/or around the inner containment area to ascertain a turbidity gradient. Measurements were subsequently collected in numerous locations adjacent to the outer booms (inner containment area not accessible [fueling barge, rough water]). Additional note: reverse currents were observed (and confirmed per tide charts) at approximately 1730, with field parameters effectively "flipping" locations (i.e., higher turbidity observed to the south).

Issues Identified:

- Based on initial visual assessment, the bubble curtain appears to contribute to turbidity within and in the vicinity of the outer containment area. Collection of turbidity measurements (prior to dredging) along the perimeter indicated turbidity around 10 NTU.

Pictures and brief videos from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/08/05

Sean/All,

Gasco Field Update 9/08/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued dredging. Barge is full and a replacement is expected in the morning (9/9). Barge will begin transport to Port of Morrow and offloading of barge is expected to commence Monday morning. Revised volume of material dredged Wednesday is approximately 600 cubic yards. Total load thus far is estimated at approximately 1800 yards.

- Additional fine tuning of outer oil boom.

- Fine-tuning of spill plate mechanism (placement of hanging fabric barrier).

- Additional fine tuning, and complete inspection of silt curtain by divers. Inspection was performed along the E-B transect.

- Continued collection of field and lab water quality parameters. Observations were similar to those yesterday, with moderately elevated turbidity in the downstream locations (up to 15). Slack tide conditions were noted at the very end of the day (1730), as the last field parameters were being collected. Subsequent confirmatory readings in the upstream location had turbidity at 15 and 17 NTU at 1' and 15' bs, respectively. This, based on visual obersrvation and tide chart, was apparently due to the reversing of the current.

- Collection of grab sample from silt curtain-mudline interface for visual inspection. No anomalies noted, other than very slight increase in visual turbidity in downstream location.

- Bathymetric survey.

Issues Identified:

- Dredging with the environmental bucket was deemed to difficult to continue; contractor switched over to the clamshell bucket after discussions/receipt of approval from EPA. One hour down time.

- Oil tanker expected next Thursday and is likely to impact dredging activities from Thurday afternoon to Friday afternoon. Sevenson indicated they would work Saturday to make up lost time. The arrival of this tanker was initially unanticipated, per FAMM (lesse) personnel.

Schedule:

No issues identified at this time. Dredging proceeding consistent with schedule.

Pictures from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/09/05

Sean/All,

Gasco Field Update 9/09/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued dredging, but only enough to complete loading of first barge (approximately 5 - 8 buckets). Second barge did not arrive Friday morning as anticipated, and was expected to arrive around 1600 Friday. As such, dredging was minimal Friday.

- Repositioning of outer oil boom due to the boom coming loose after hours on Thursday. No dredging was conducted while boom was out of position.

- Additional fine tuning of silt curtain by divers.

- Continued collection of field and lab water quality parameters. Turbidity readings were up to 8 NTU at the downstream location (minimal dredging Friday).

- Visit to site by agency reps (Eric Blischke, Heidi Blischke, Matt McClincy , Rene Fuentes) and EI (Christian, Borock).

Issues Identified:

- EI raised concern regarding effectiveness of spill plate (hanging fabric) and drippings from dredge bucket contributing to turbidity. Potential BMPs to be discussed with contractor.

Schedule:

- Offloading of first barge is expected to be delayed from Monday morning to Tuesday morning.

Pictures from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/12/05

Sean/All,

Gasco Field Update 9/12/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued dredging, initially using the environmental bucket, followed by the clamshell bucket upon inefficient retrieval of sediments/tar body. First barge offsite at 0800 with second barge in it's place at ~0825. Dredge operator appeared to be taking greater care in regards to over-filling bucket and minimizing drippings/sloughing.

- Continued collection of field and lab water quality parameters. Turbidity readings were up to 17 NTU at the downstream location. No anomalies noted in readings, samples and visual samples collected at silt curtain-mudline interface.

- Bathymetry survey at end of day.

Issues Identified:

- The determination of whether reverse flow is in effect is not as effective as it should be. Andrew Somes suggested, and Anchor agreed, that tidal and/or current charts should be incorporated into this assessment on a daily basis, so as to anticipate reverse flow conditions and alter the monitoring points as appropriate. Thus far, reverse flow conditions are apparent at the end of each day.

Schedule:

- Offloading of first barge is now expected to be delayed from Tuesday morning to Wednesday morning.

- 700-foot tanker is expected Wednesday evening, likely precluding any dredging on Thursday as the oil booms need to be moved and room made for the tanker. Dredging expected to resume Friday morning.

Pictures from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/13/05

Sean/All,

Gasco Field Update 9/13/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued dredging, using the clamshell bucket. Yardage dredged though end of Monday is approximately 2800 cu yd. Estimated yardage Tuesday about 900 cu yd.

- Continued collection of field and lab water quality parameters. Turbidity readings were up to 16 NTU at the downstream location. No anomalies noted in readings, samples and visual samples collected at silt curtain-mudline interface. Reverse current detected and accounted for at end of day.

- Bathymetry survey at end of day.

- Visit to site by Sean Sheldrake, John Malek, Nancy Munn and Judy Smith (EPA).

Issues Identified:

- Dredge personnel spotted a dead fish (adult Coho salmon) onshore at 0910. Dredging ceased immediately and agencies were notified by Anchor. John Malek was onsite at time of discovery. Nancy Munn (NMFS) gave verbal approval to continue dredging, as did John Malek and Sean Sheldrake. Dredging resumed at 1208.

Schedule:

- 700-foot tanker is expected Wednesday evening, likely precluding any dredging on Thursday as the oil booms need to be moved and room made for the tanker. Dredging expected to resume Friday morning.

- Total volume removed to date is approximately 3700 cu yd, which appears to be approximately on schedule (total to be removed is 15000 cu yd).

Pictures from todays activities are located on the PMX FTP site.

Daily E-mail Update: 9/14/05

Sean/All,

Sorry for the delay in getting this email out.

Gasco Field Update 9/14/05
Andrew Somes - Parametrix Field Staff, GASCO site
Adam Romey - Parametrix Field Staff, Transfer Facility

Activities Conducted:

- Continued dredging, using the clamshell bucket. Preliminary estimated yardage Wednesday between 400 and 500 cu yd. Dredging ceased for the day at 1238 (see "Issues" below).

- Continued collection of field and lab water quality parameters. Turbidity readings were up to 15 NTU at the downstream location, with DO in the 8.5 range.

- Bathymetric survey at end of day.

- Continued fine tuning/inspection of oil boom and bed-load baffle. This activity was also conducted Tuesday, as was a complete inspection of the silt curtain along the B-E transect.

- Offloading at transfer facility (activity ceased; see below)

Issues Identified:

- Andrew Somes spotted a distressed fish within the dredge prism at ~1238. Dredging ceased and agencies were notified immediately by Anchor. Two more fish were subsequently spotted (at 1310), with all fish being retrieved (4.5" bluegill, 6" sunfish, 7" crappie). Water samples were subsequently collected within the primary containment area for laboratory analysis of total sulfides and DO. Field readings of DO and turbidity within the primary containment area were 7.75 and 65 NTU at 1' bs, 7.48 and 93 NTU at 10' bs, and 7.26 and 112 NTU at 19' bs, respectively.

- Analytical data from last weeks (9/7, 9/8) downstream water quality samples indicate exceedances of various trigger levels (both chronic and acute).

- Material barged to Boardman appears to be to wet for acceptance by Waste Management; Material on current barge must be dewatered/mixed with additional drying agent in order to meet criteria. How this will be accomplished is pending.

- All available dredge BMPs are expected to be implemented to limit additional water quality exceedances, including treatment of dewater prior to being discharged back to the containment area.

Schedule:

- The various issues arising today (fish kill, water quality) have impacted the schedule, with dredging potentially not resuming until Friday or Monday.

- Current volume removed is about 4000 cu yds.

Pictures from todays activities are located on the PMX FTP site, including those at the transfer facility.

Daily E-mail Update: 9/15/05

Sean/All,

Gasco Field Update 9/15/05
Andrew Somes - Parametrix Field Staff

Dredging operations were shut down all day Thursday due to issues discovered on Wednesday (3 dead fish and water quality exceedances), in addition to a large tanker unloading at the site Thursday which precludes dredging.

Activities Conducted:

- Fish finding within the containment area. Based on information from Anchor, no fish were detected in the containment area.

- Divers were placing anchors relating to the outer containment area (to be constructed once the inner area has been dredged)

Issues Identified:

- Based on the water quality exceedances, all available BMPs will be implemented at the site, including the treatment of dewater from the barge into the containment area.

- At the direction of John Malek, additional background sampling will be conducted (scheduled for 9/16).

Schedule:

- The issues arising this week has/will affect the schedule. It is expected that dredging will continue late Friday, once the barges have been repositioned at the site (they were moved to accomodate a large tanker Thursday).

Daily E-mail Update: 9/16/05

Sean/All,

Gasco Field Update Friday 9/16/05
Andrew Somes - Parametrix Field Staff, Gasco Site
Rick Wadsworth - Parametrix Staff, Transfer Facility (9/17)

Activities Conducted:

- Collection of additional laboratory water quality samples prior to dredging, at eight different locations. Samples collected at 3 depths at 6 of the locations (18 samples total), and samples collected at 2 depths at the other 2 locations (4 samples, offshore of US Moorings).

- Continued placement of anchors for the outer removal area.

- Return and positioning of transfer barge.

- Closing of oil boom in outer containment area.

- Very brief resumption of dredging

- Collection of field water quality measurements. NTU up to 10 in "downstream" location (strong reverse flow). No lab samples collected.

- Off-loading operations resumed at the Transfer facility on Saturday, 9/17. The material was still somewhat wet and transfer operations primarily involved removing the dryest material from the barge and loading onto trucks for disposal. Procedures for dealing with the wet material were pending as of 4:00 Saturday.

Issues Identified:

- First barge of material at transfer facility was too wet for acceptance by Waste Management. Subsequent mixing of removed material at the Gasco facility has used significnatly more drying reagent.

Schedule:

- Dredging is expected to resume Monday, with the implementation of all available BMPs.

Photos of transfer facility attached; the remaining photos from the site and transfer facility are on the PMX FTP site.

Daily E-mail Update: 9/19/05

Sean/All,

Gasco Field Update Monday 9/19/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Collection of additional water quality samples prior to dredging, at upstream and downstream locations.
- Resumption of dredging at 1445 subsequent to positiong of barges and placement/preparation of equipment. BMPs are being implemented, with less overfilling of bucket. Estimated yardage removed was about 500 cu yd. The barge onsite (the third) has a volume of about 1100 cu yd.
- Collection of normal field and laboratory samples subsequent to commencement of dredging. An additional laboratory sample was collected upstream. Reverse flows were observed at 1600, with NTU up to 7 in the "downstream" location.
- Continued placement of anchors for the outer removal area. Divers also deployed an additional 150' section of impermeable silt curtain to cover a vertical tear that apparently occurred while maneuvering the derrick. The additional curtain was lashed and secured to the existing curtain such that the additional curtain brackets the tear by its full approximately 150-foot length. The deployment appears effective, but closer on-derrick inspection will be conducted Tuesday morning.
- Pumping and discharge of transfer barge water with use of new dewater filtering system. The system is comprised of an oil/water separator, filter, and carbon filter. Todays first useage suggests efforts to reduce the solids in the water will be needed, as the filter is clogged relatively quickly.

Notes: Anchor collected some dredge material for the purposes of testing alternative drying reagents.

Issues Identified:

Recent water quality results (for 9/13 and 9/14) indicated exceedances similar to those on the first days of operations; however, samples were collected prior to implementing additional BMPs. Further water analysis and additional background sampling should provide better information on the impact of dredging to water quality.

Schedule:

Volume removed (approx. 4000 cu yd) is relatively on schedule. It appears that off-loading of barges at the Port of Morrow will take longer than expected.. Additional barges may be necessary (currently there are 3 being utilized) to avoid downtime.

Pictures of todays activities are on the PMX FTP site.

Daily E-mail Update: 9/20/05

Sean/All,

Gasco Field Update Tuesday 9/20/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Collection of additional water quality samples prior to dredging, at upstream and downstream locations.

- Commencement of dredging at 0845. Estimated yardage about 500-600 cu yd; revised estimate for Monday is 300-400 cu yd. The barge onsite (the third) has a volume of 1100 cu yd, and is expected to be full tomorrow.

- Continued collection of normal and additional field and laboratory samples. NTU up to 9 in the "downstream" location.

- Continued placement of anchors for the outer removal area. The additional silt curtain apears effective and secure, per visual observation and discussion with Sevenson personnel.

- Pumping and discharge of transfer barge water with use of new dewater filtering system. Samples of influent and effluent were collected.

- Visit to site by various DEQ personnel.

Issues Identified:

- See Schedule below

Schedule:

- As of Tuesday evening, dredging is expected to cease Wednesday, due to barge availability. This may change, pending efforts of contractors. The first barge sent to the Port of Morrow is expected to be fully offloaded by Wednesday and sent back to Portland. The second barge is expected to arrive in Morrow on Wednesday to be offloaded Thursday and Friday.

No photos for Tuesday.

Daily E-mail Update: 9/21/05

Sean/All,

Gasco Field Update Wednesday 9/21/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Bathymetric survey prior to dredging.

- Commencement of dredging at 1047, ending at ~1230. Estimated yardage about 150 cu yd. The barge onsite is now full.

- Collection of normal and additional field and laboratory samples (see Issues below). NTU up to 10 in the "downstream" location.

- Continued placement of anchors for the outer removal area. Divers expected to finish task by end of Wednesday, with inspections of silt curtains, etc on Monday and weekly thereafter.

- Pumping and discharge of transfer barge water with use of new dewater filtering system. Samples of influent and effluent were collected.

- Offshore observation of site by various EPA personnel.

Issues Identified:

- Technical difficulties with water quality instruments ("Hydrolab") precluded the collection of pre-dredge water quality readings. The problem was resolved in time to collect readings subsequent to commencement of dredging (at 1-hour mark).

- Currently waiting for overdue analytical results from additional background samples and daily water quality samples from late last week and early this week.

Schedule:

- Dredging is expected to resume Friday morning while awaiting return of Chetco barge (the first); no dredging will be conducted on Thursday The second barge arrived at the Port of Morrow Wednesday afternoon to be offloaded Thursday and Friday.

- Although there has been a number of shutdowns or delays through the early parts of this project, based on the production rate and current volume removed, it appears that the schedule is still on track (dredging to be completed by approx. 10/14/05).

No photos for Wednesday.

Daily E-mail Update: 9/22/05

Sean/All,

Gasco Field Update Thursday 9/22/05
Andrew Somes - Parametrix Field Staff (offloading facility)

No dredging performed Thursday.

Activities Conducted at Boardman facility:

- Offloading of barge 2. Activities conducted in a clean and safe manner, with attention paid to cleanliness and containment of dredge material (see photos). Based on visual observation, dredge material appeared to be dry enough for disposal.

- Collection of upstream and downstream water quality readings, with NTU less than 2.

Issues Identified:

- The production rate for offloading is significantly less than the dredging production rate. Additional barges and/or modification to offloading may be required to avoid delays if dredging production rate increases.

Schedule:

- Dredging is expected to resume Friday morning.

Photos taken Thursday at the offloading facility are on the Parametrix ftp site.

Daily E-mail Update: 9/23/05

Sean/All,

Gasco Field Update Friday 9/23/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Resumption of dredging at 0800. Estimated dredged yardage for the day was about 500 cu yd. The barge onsite (the fourth, "Chetco") came back from Boardman approximately a third full to allow for mixing of drying reagent. Total volume of barge should allow for a full day of dredging on Monday.

- Collection of field and laboratory samples subsequent to commencement of dredging. Reverse flows were observed at ~0930, with NTU up to 8 in the "downstream" location.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

Issues Identified:

Modification of offloading process is expected to occur over the weekend. Process will incorporate two side-by-side containers into which the dredge bucket will deposit material, and from which an excavator will transfer the material to trucks. The containers will be placed on 60-mil sheeting and a "spill plate" between the two containers is planned.

Schedule:

Total yardage removed is about 5000 cu yds. Modification of the transfer operations should result in quicker turnaround times for the barges return to Portland.

Pictures of todays activities are on the PMX FTP site.

Daily E-mail Update: 9/26/05

Sean/All,

Gasco Field Update Monday 9/26/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Resumption of dredging at 0800. Revised yardage dredged Friday 9/23/05 is 700 cu yd. Barge onsite is likely to be filled Tuesday.

- Dredging along shoreline produced a darker sheen and created substantially more sheen (see photos taken at 1337)

- Collection of field and laboratory samples subsequent to commencement of dredging. NTU up to 17 in the downstream location. Excessive sheens and surfacing of "blebs" were observed in the morning at the upstream sampling location (~300 ft upstream, see photos taken at 0924). Sheens did not appear to be related to activities within the containment area.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples. Carbon filter portion of treatment system is clogged, requring maintenance and/or change out.

- Bathymetry survey.

- Observation of dredging along shoreline by archaeologist (AIN). No anomalies noted.

- Inspection of silt curtain by divers. At approximately 1500 a tear along the A-B transect was spotted at the surface, and dredging was ceased immediately. Based on initial observation, the tear does not appear to extend to the bottom. Further inspection by divers will be completed, with resolution by Tuesday morning. The remainder of the silt curtain passed inspection.

Issues Identified:

- At 1150, Parametrix personnel spotted a distressed fish, and dredging was ceased immediately. Anchor notified the appropriate agency personnel. Authorization to proceed was obtained within an hour (from NMFS), but in the meantime an additional 8 fish were collected (the first fish could not be retrieved). All fish were less than 2-3 inches in length and appeared to be juvenile sunfish, with one crappie. Water samples from within the affected area were collected within an hour (DO & total sulfides).

- Revisited dredging BMPs directly with Hickey personnel, indicating that "dunking" of bucket is not acceptable and that an alternative method should be employed (e.g.,

washing and containing wash water). Also re-indicated that operator should avoid any overfilling of dredge bucket, although Hickey indicated that there is some difficulty doing such with the material they are currently encountering.

Schedule:

The revised total yardage removed is about 6000 cu yds.

Pictures of todays activities are on the PMX FTP site.

Daily E-mail Update: 9/27/05

Sean/All,

Gasco Field Update - Tuesday 9/27/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Dredging at 1112 subsequent to silt curtain remedy (see below). Yardage dredged Monday 9/26/05 was 750 cu yd, according to Sevenson. Barge onsite is full.

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 6 in the downstream location. Lab samples were collected at three locations, per revised regimen (2 downstream, and 1 upstream, 3 depths each). Lab samples were also collected at mid-depth inside and outside the silt curtain along the A-B transect. Eleven samples total.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples. System functioning, although carbon filter will likely be saturated soon.

- Bathymetry survey.

- Observation of dredging by archaeologist (AIN), although shoreline dredging did not occur Tuesday. No anomalies noted.

- Remedy of silt curtain tear by divers (see photos). Confirmatory inspection by divers indicated the tear is only at the surface (~1 foot) and does not extend down through the silt curtain material. Divers draped filter fabric over the tear and secured the fabric on the bottom with chain. Remedy appears effective and secure, but will be monitored closely.

Issues Identified:

Continued periodic exceedance of chronic and acute criteria at downstream sampling locations. Increased sampling has and will occur to further define background conditions and establish trends and/or extent of exceedances.

Schedule:

Barge onsite is full, and barge in Boardman is expected to arrive at the Gasco site Wednesday night. No dredging will occur on Wednesday, but is expected to resume Thursday morning. Total yardage dredged is near 7000 cu yds.

Pictures of todays activities are on the PMX FTP site.

Daily E-mail Update: 9/28/05

Sean/All,

Gasco Field Update - Wednesday 9/28/05
Andrew Somes - Parametrix Field Staff (GASCO site)
Ingmar Saul - Parametrix Field Staff (Transfer facility)

No dredging performed Wednesday. Estimated yardage dredged Tuesday the 27th is 300 cu yd.

Activities Conducted:

- Preparation of on-barge dredge material for transfer (mixing, tarping).

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Silt curtain tear remedy along A-B transect still appears secure.

- Offloading activities continued to be conducted at the Port of Morrow. The modified offloading process appears to have increased the daily production rate substantially. Approximately 48 trucks were loaded on Tuesday, 30 trucks Wedsnesday.

Issues Identified:

Based on the influent/effluent samples collected from the treatment system, it appears that the carbon vessel is nearing its' effective capacity. EPA directed NWN to changeout the carbon vessel immediately.

Schedule:

Dredging expected to resume Thursday morning.

No photos for Wednesday. Photos of modified offloading operations will be posted Friday.

Daily E-mail Update: 9/29/05

Sean/All,

NOTE: New location of photos on FTP site (see below for links)

Gasco Field Update - Thursday 9/29/05
Andrew Somes - Parametrix Field Staff (Gasco site)
Ingmar Saul - Parametrix Staff (Transfer facility)

Activities Conducted:

- Dredging at 0835, with new barge in place. In addition to dredging in the center of the dredge prism, additional dredging along the shore occurred today (numerous photos available on ftp site). As previously noted, a thicker, darker sheen is apparent when dredging along shore. Additionally, moist areas along the cut face were visible, suggesting pockets of lighter fraction tar body/product. No large flow of product-like material was noted, although what appeared to be a small short-lived seep was evdident in the west cut face (photo 009 @ 1218).

- Collection of pre-dredge lab samples at the three specified locations. Normal river flow at this hour (~0730 - 0830).

- Continued collection of field and laboratory samples subsequent to commencement of dredging, per revised regimen (2 downstream, and 1 upstream, 3 depths each). Lab samples were also collected at mid-depth inside and outside the silt curtain along the A-B transect, near point B. Reverse flow conditions were observed in the afternoon.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples. New carbon filter was not onsite as of 1745.

- Bathymetry survey.

- Observation of dredging along shoreline by archaeologist (AIN). No anomalies noted.

Issues Identified:

Continued exceedances of chronic and acute criteria. Additional BMPs directed this week include: changeout of carbon unit regulary on treatment system (expected to be completed 9/30/05), cleaning of dredge bucket over barge, and increased diver inspections on silt curtains.

Schedule:

Dredging appears to be on schedule. Modification of the transfer facility operations appears to have increased the turnaround of barges, which should limit future delys due to lack of barges.

Pictures of todays activities located in a new location on the PMX FTP site. Follow the link:

ftp://ftp.parametrix.com/Private/EPA/

Login: epa
Password: environment

OR you can use this link to automatically log you in...

ftp://epa:environment@ftp.parametrix.com/Private/EPA/

Daily E-mail Update: 9/30/05

Sean/All,

NOTE: New location of photos on FTP site (see below for links)

Gasco Field Update - Friday 9/30/05
Andrew Somes - Parametrix Field Staff (Gasco site)

Activities Conducted:

- Dredging at 1015, subsequent to installation of new, 2000-lb carbon unit (original filter plugged/saturated and not passing water). Friday, Anchor was directed to install second unit as polishing vessel. Yardage dredged Thursday = 825 cu yd. Yardage Friday = ~500 cu yd. Dredging in center of dredge prism and along shore (see photos). Dredging ceased at 1430.

- Continued collection of field and laboratory samples subsequent to commencement of dredging, per revised regimen (2 downstream, and 1 upstream, 3 depths each). Lab samples were also collected at mid-depth inside and outside the silt curtain along the A-B transect, near point B. Highest NTU reading in downstream location was 6.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Observation of dredging along shoreline by archaeologist (AIN). No anomalies noted.

Issues Identified:

See schedule below.

Schedule:

Due to the multiple delays, including lack of available barges on Wednesday, dredging appears to be slightly behind schedule (approx. 8.5K cu yds removed of total 15K cu yds). However, the daily production rate is higher than expected, and with multiple moderate-volume days, dredging should be back on schedule. Modification of the transfer facility operations appears to have increased the turnaround of barges, which should limit future delays due to lack of barges.

Pictures of todays activities located in a new location on the PMX FTP site. Follow the link:

ftp://ftp.parametrix.com/Private/EPA/

Login: epa

Password: environment

OR you can use this link to automatically log you in...

ftp://epa:environment@ftp.parametrix.com/Private/EPA/

Daily E-mail Update: 10/03/05

Sean/All,

Sorry for the delay in getting this out.

NOTE: New location of photos on FTP site (see below for links)

Gasco Field Update - Monday 10/03/05
Andrew Somes - Parametrix Field Staff (Gasco site)

Activities Conducted:

- Dredging at 0945, subsequent to repositioning of barges and miscellaneous on-barge tasks. Dredging ceased at 1600. Estimated yardage Monday is 750 - 800 cu yd.

- Continued collection of field and laboratory samples subsequent to commencement of dredging, per revised regimen (2 downstream, and 1 upstream, 3 depths each). Lab samples were also collected at mid-depth inside and outside the silt curtain along the A-B transect, near point B. Highest NTU reading in downstream location was 10. Normal river flow during sample/reading collection.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples. Disharge took place today with only one carbon unit in place, per approval. The second carbon unit arrived onsite at 1615 and will be in place Tuesday.

- Divers working on bed-load baffle, and adjusted filter fabric draped over small tear in silt curtain along A-B transect.

- Observation of dredging along shoreline by archaeologist (AIN). No anomalies noted.

- Visit to site by Ken Cameron (DEQ). Inspected shoreline cut face, and was shown additional tar deposits to the south.

Issues Identified:

No additional issues at this time.

Schedule:

The daily production rate continues to be high, but total volume removed appears to be slightly behind schedule due to numerous delays, as noted previously. Volume removed is near 9,000 cu yds.

Pictures of todays activities located in a new location on the PMX FTP site. Follow the link:

ftp://ftp.parametrix.com/Private/EPA/

Login: epa
Password: environment

OR you can use this link to automatically log you in...

ftp://epa:environment@ftp.parametrix.com/Private/EPA/

Daily E-mail Update: 10/4/05

Sean/All,

NOTE: New location of photos on FTP site (see below for links)

Gasco Field Update - Tuesday 10/04/05
Andrew Somes - Parametrix Field Staff (Gasco site)

Activities Conducted:

- Dredging at 0900, and ceased at 1640. Approximately 1.5 hours worth of dredging today (20 mins, 40 mins, 35 mins) with hours in between. Arrival of new barge, departure of last barge, and repositioning of barges/equipment.

- Pumping and discharge of transfer barge water with use of treatment system (both carbon units), and collection of influent and effluent samples.

- Divers working on bed-load baffle.

Issues Identified:

No additional issues at this time. The treatment system is fully operational and has been modified to include several filtering steps, as well as two carbon treatment units in series.

Schedule:

The total volume dredged is about 9,500 cu yds of the 15,000 total, which appears to put the project a couple of days behind schedule, depending on production rate. Schedule called for completion of dredging by about Oct. 14th to allow for verification of final dredge volume, collection of post-dredge samples, and capping prior to close of the fish window on November 1.

Pictures of todays activities located in a new location on the PMX FTP site. Follow the link:

ftp://ftp.parametrix.com/Private/EPA/

Login: epa
Password: environment

OR you can use this link to automatically log you in...

ftp://epa:environment@ftp.parametrix.com/Private/EPA/

Daily E-mail Update: 10/05/05

Sean/All,

Gasco Field Update - Wednesday 10/05/05
Andrew Somes - Parametrix Field Staff (Gasco site)

Activities Conducted:

- Yardage dredged Tuesday was ~300 cu yd.

- Dredging commenced at 0900 and ceased at 1730, with approximately 2.5 hours pause throughout the day. Barge onsite will likely be full Thurdsday am. Next barge is expected Friday am.

- Continued collection of field and laboratory samples subsequent to commencement of dredging, per revised regimen. Lab samples were also collected at mid-depth inside and outside the silt curtain along the A-B transect, near point B. Highest NTU reading in downstream location was 12, but was observed immediately following re-activating the bubble curtain to full force (after short temporary throttle down), which contributes to turbidity. Subsequent NTU readings were less. Three sets of data collected, with reverse flow observed during the latter two.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Divers completed deployment of bed-load baffle.

- Observation of dredging by archaeologist (AIN). No anomalies noted.

Issues Identified:

No new issues at this time.

Schedule:

It is expected that dredging will occur only partial day Thursday due to near-full barge.

Pictures of todays activities located in a new location on the PMX FTP site.

Daily E-mail Update: 10/06/05

Sean/All,

Gasco Field Update - Thursday 10/06/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Yardage dredged Wednesday was ~730 cu yd. Total yardage to date is 10,455 cu yds.

- Dredging commenced at 0830 and ceased at 1220 (~ 1.5 hours dredging total). Dredging consited of fine-grading based on bathymetry data obtained Wednesday evening. Inner removal area is complete, except for additional tar-body outside dredge prism (see Schedule below). Barge onsite is full and departed site at 1530. Next barge is expected onsite Sunday.

- Continued collection of field and laboratory samples subsequent to commencement of dredging, per revised regimen. Lab samples were also collected at mid-depth inside and outside the silt curtain along the A-B transect, near point B. No NTU exceedances.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Divers anchoring bed-load baffle, and re-securing silt curtain to anchor along the D-E transect at southernmost reach of inner containment area (curtain was dislodged by tugboat wash). *Note omission from Wednesday: Divers deployed additional permeable silt curtain in front of existing curtain due to discovery of two small tears along the A-B transect during inspection Wednesday morning. Deployment appears secure and effective, but will be monitored closely.

- Observation of dredging by archaeologist (AIN). No anomalies noted.

- Bathymetry survey.

Issues Identified:

As requested by DEQ/EPA, approximately 20 cu yds of tar material outside dredge prism will be removed on Friday morning. Material will be stored on transfer barge until next haul barge is onsite. Thursday dredging of this area could not be completed due to position of dredge and low water level precluding movement.

A tanker to be onsite Sunday may impact anticipated schedule (see below)

Schedule:

Based on preliminary bathymetry data, the inner dredge area is complete. 10,455 cubic yards dredged to date. Approxinately 5,000 yards left in outer area.

Scheduled activities for Friday and Saturday include setting up outer containment area and site maintenance.

According to latest information provided by terminal personnel, a fueling tanker is expected onsite at 3 am Sunday. The tanker is anticipated to be onsite for 18 hours, impacting deployment of partial-length silt curtain, and recommencement of dredging. Current estimate for next dredging is first thing Tuesday morning, or possibly late Monday.

No pictures of todays activities.

Daily E-mail Update: 10/07/05

Sean/All,

Gasco Field Update - Friday 10/07/05
Andrew Somes - Parametrix Field Staff

- Yardage dredged Thursday was ~160 cu yd.

Activities Conducted:

- Dredging Friday consisted of removing additional tar body outside the dredge prism (~35 yd) per EPA/DEQ direction. Activity took 25 minutes.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Divers working on bed-load baffle and partial length silt curtain. Additional silt-curtain deployments are secure.

- Observation of dredging by archaeologist (AIN). No anomalies noted.

Issues Identified:

NW Natural currently researching availability of organoclay and/or carbon mats to deploy along the cut face of the shoreline. This direction given by EPA after seeps/significant sheening observed in cut face. Mats to be placed under capping material.

NW Natural and EPA currently evaluating procedures for removing the inner containment silt curtains, such that releases will be minimized. Outer containment area will be in place prior to removal of inner silt curtains.

Schedule:

Inner dredge prism area is complete. Continued set up of outer containment area Saturday/Sunday. Tanker expected Sunday, which will preclude any dredging and final outer containment set up. Dredging expected to occur late Monday or Tuesday morning.

Pictures of todays activities located in a new location on the PMX FTP site.

Daily E-mail Update: 10/8/05 & 10/09/05

Sean/All,

Gasco Field Update - Saturday 10/08/05 & Sunday 10/9/05
Andrew Somes - Parametrix Field Staff

Activities Conducted Saturday:

- Fine-grade dredging, consisting of approximately 40 yds, for ~35 minutes. Dredging conducted based on bathymetry data from Friday 10-7-05. All containment (e.g., sorbents) in-place during dredging.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Divers working on partial length silt curtain/baffle along C-D transect.

Activities Conducted Sunday:

- Divers working on partial length silt curtain/baffle along C-D transect.

- Sorbents in place and all containment secure.

Issues Identified:

See field update for Friday 10/7/05 email

Schedule:

Inner dredge prism area is complete (approx. 10,500 cu yds removed). Dredging in outer removal area expected to occur late Monday or Tuesday morning.

Pictures of the weekends activities located on the PMX FTP site.

Daily E-mail Update: 10/10/05

Sean/All,

Gasco Field Update - Monday 10/10/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Divers completed deployment of partial length silt curtain/baffle along C-D transect. In order to connect the partial-length silt curtain, brackets at points B and E on the inner silt-curtain were disconnected allowing the full length silt curtain to "billow" at both points. This allowed for slow pass through of river water through Monday night.

- Arrival and set-up of a second "back-up" barge water treatment system (complete), and a 5th carbon vessel.

Issues Identified:

Past due water quality samples are expected to be received on Tuesday.

Schedule:

The inner silt curtain will be further removed in stages Tuesday morning, with dredging potentially commencing Tuesday afternoon or Wednesday morning.

No photos for Monday 10/10/05.

Daily E-mail Update: 10/12/05

Sean/All,

Gasco Field Update - Tuesday 10/11/05 and Wednesday 10/12/05
Andrew Somes - Parametrix Field Staff

Activities Conducted Tuesday:

- Repositioning of barges, debris (piles, wood) handling, and miscellaneous equipment tasks.

- Divers made final connections on partial-length silt curtain at points B and E, and disconnected inner silt curtain anchors and removed sections of the curtain.

- Collection of early morning background field and lab water quality samples, and collection of a second set 1 to 1.5 hours after first portion of silt curtain removed.

Activities Conducted Wednesday:

- Dredging commenced at 1130. Approximately 3.5 hours dredging throughout the day.

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 8 in the downstream location.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

Issues Identified:

Bubble curtain was causing billowing of outer containment silt curtain and potential compromising of integrity of silt curtain. After discussion with EPA, the bubble curtain was turned off.

Latest water quality results indicated that acute exceedences were seen at 400 feet downstream. EPA directed samples to be collected 600 feet downstream to try and define the extent of exceedences.

Schedule:

Latest projection for finishing dredging is the 17th or 18th. Barge in Boardman should be onsite before current barge is full. Dredging this weekend likely.

Pictures of todays activities are on the PMX FTP site.

Daily E-mail Update: 10/13/05

Sean/All,

Gasco Field Update - Thursday 10/13/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Dredging commenced at ~0800, and ceased at ~1800, with about 1.5 hours pause in between (bathymetry survey). Yardage dredged Wednesday about 650 yds. Yardage dredged Thursday about 1040 yds.

- Wednesday dredging in the morning utilized the environmental bucket, which has been working well. Wednesday afternoon, as well as Thursday dredging, utilized conventional bucket due to material encountered. Continued dredging will swap back and forth between environmental and conventional buckets dependent on the feasibility of the material encountered.

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 4 in the "downstream" location (reverse flow/slack tide observed during the latter 2 of 3 readings). Samples/readings collected at the 600' downstream location, per request by EPA, as was the case Wednesday.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples. Anchor indicated the effluent sample was collected from the 1st carbon filter since the 2nd filter was being changed out at the time of sample collection.

- Bathymetry survey.

- Divers inspecting and fine-tuning curtain.

Issues Identified:

Bubble curtain still turned off. Will likely start dismantling system soon.

With very-low tide in AM today, the southern edge of the dredge prism along the shore was more visible, exposing the tar body remaining in this location after the additional yardage was dredged (see photo taken at 1210).

Schedule: Total yardage removed is about 12,100 yds. Latest projection for finishing dredging is the 17th. Barge in Boardman should be onsite before current barge is full. Dredging this weekend is likely.

Pictures of todays activities are on the PMX FTP site.

Daily E-mail Update: 10/14/05

Sean/All,

Gasco Field Update - Friday 10/14/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Dredging commenced at ~1000, with about 1.5 hours total dredge time for the day. Yardage dredged Friday ~255 cu yd. Barge onsite at beginning of day was filled and switched out with final barge at ~1700.

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 4 in the "downstream" location.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Observation of site activities by EI representative.

Issues Identified:

A relatively large gap was observed in the outer silt curtain at the location of the contractor door. Based on observations it appears that because of the way it is anchored (or lack of anchoring), the contractor door billows or floats when reverse flow is observed (see pictures with reverse and normal flow). Contractor was to add chain weight to curtains and attempt to tie curtain and contractor door together to prevent separation.

Schedule:

Total dredge amount is about 12,500 yards. Dredging to be complete by Monday.

Pictures of Fridays activities are on the PMX FTP site.

Daily E-mail Update: 10/15/05 & 10/16/05

Sean/All,

Gasco Field Update - Saturday 10/15/05 and Sunday 10/16/05
Andrew Somes - Parametrix Field Staff

Activities Conducted Saturday:

- Dredging commenced at ~0810, and ceased ~1800. Yardage dredged Saturday = 950 cu yd.

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 8 in the "downstream" location (during reverse flow).

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Bathymetry survey.

Activities Conducted Sunday:

- Dredging commenced at ~0800, and ceased ~1300. Dredging complete pending confirmatory bathymetry survey Monday morning.

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 8 in the downstream location.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

Schedule:

- Comfirmatory bathymetry survey Monday morning, with 3rd party bathymetry survey Tuesday. Capping expected to commence Wednesday.

Pictures of the weekends activities are on the PMX FTP site.

Daily E-mail Update: 10/17/05

Sean/All,

Gasco Field Update - Monday 10/17/05
Andrew Somes - Parametrix Field Staff

Activities Conducted Saturday:

- Dredging commenced at ~0830, and ceased ~0945, then 1 bucket dredged at 1030. Results of afternoon bathymetry survey resulted in more dredging at 1715 until ~1900 (dark).

- Collection of field and laboratory samples subsequent to commencement of dredging: NTU up to 11 in the downstream location (1' above mudline sample). Both events were during normal flow conditions.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Bathymetry survey.

- Attempt at retrieving sediment stakes at 1600; the diver (RSS) was unable to locate the first stake and the rope running between stakes, with lack of daylight hours to proceed with second attempt. A second attempt is expected Tuesday afternoon. Diver noted a few "spud holes"(from barge spuds) in the area of stake deployment, suggesting "spudding" may have impacted the stakes/rope.

Issues:

Contractor added additional weights to the contractor gate curtain, and they are apparently effective at keeping curtain in place (no billowing, visible gap). See attached picture, taken during reverse flow conditions (same conditions when original problem was observed).

Schedule:

- Third-party comfirmatory bathymetry survey Tuesday morning, with additional dredging, if needed. Sediment grab samples to be collected in the afternoon once dredging is 100% complete. Capping of the dredge prism is expected to commence Wednesday afternoon or Thursday morning, which will take 1 to 2 days. At that time, removal of the outer containment will start and then capping of fringe areas.

No photos for Monday the 17th.

Daily E-mail Update: 10/18/05

Sean/All,

Gasco Field Update - Tuesday 10/18/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Dredging (to remove high spots based on bathymetry data) commenced at ~0715, continuing intermittently until ~1105. Fifty to sixty yards dredged Tuesday.

- Collection of field and laboratory samples subsequent to commencement of dredging: no exceedances of field parameters.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Third-party bathymetry survey of entire inner containment area. EPA review of data is expected Wednesday.

- Collection of 2 sediment grap samples (PD06, PD12). Both samples exhibited strong petroleum odors and visual contamination (see photos). However, the visual contamination in sample PD06 appeared to be surficial (~1cm in depth). PD12 was visually contaminated throughout, with evidence of liquid fraction.

- Dismantling of onshore bubble-curtain equipment (compressors, etc.)

Issues:

- Second attempt at retrieving sediment stakes; again, the diver (RSS) was unable to locate the stake or the rope running between stakes. Diver again noted spud holes in the area. Without this data, EPA will likely require fringe cap to extend to the outer containment area and bedload baffle.

Schedule:

- Remaining sediment grab samples to be collected Wednesday am/pm. Capping of the dredge prism is expected to commence Thursday morning, which will take 1 to 2 days. Upon completion of that task, removal of the outer containment will start and then capping of fringe areas.

Points of interest:

Located on the ftp site are a few photos taken in the derrick cabin, showing the layout and the computer GPS software used to locate the bucket and "mark" bucket dredge points. In

the photo of the computer screen, the blue X in a circle signifies the position of the bucket, and the red X'es mark points from where buckets of dredge material were removed. The areas outlined in black are "high spots" based on Monday's bathymetry. Hence the red Xes in these areas.

Photos of site activities are located on the Parametrix ftp site.

Daily E-mail Update: 10/19/05

Sean/All,
Gasco Field Update - Wednesday 10/19/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Final grade dredging commencing at ~0900, and proceeding intermittently (1-2 buckets at a time) until ~1040. Material was dredged from areas specified by EPA based on 3rd party bathymetry data (from around the pylon offset and from the flat area of the dredge prism), totalling approximately 75 cu yds. Verification of final depths was performed using a lead line at dredge point, and factoring tide guage readings in determination of final depth. Final approval by EPA expected Thursday morning.

- Collection of remaining sediment grab samples, and collection of new samples for points PD06 and PD12 due to additional dredging, with associated QC samples.

- Pumping and discharge of transfer barge water with use of treatment system, and collection of influent and effluent samples.

- Adjustment and maintenance of inner containment by divers, and cutting of bubble curtain pipe into sections.

- Departure of final haul barge and material barge, and arrival of flat barges onto which containment material and bubble curtain pipe will be loaded. The capping material barge was expected towards the end of the day.

- Disassembly of all onshore bubble curtain equipment.

Issues Identified:

Based on EPA requirement that fringe cap must extend to outer containment, field work will likely require extension of approximately 4-5 days beyond fish window. NMFS expected to approve this modification.

Schedule:

Capping expected to commence Thursday morning.

Daily E-mail Update: 10/20/05

Sean/All,
Gasco Field Update - Thursday 10/20/05
Andrew Somes - Parametrix Field Staff

Total yardage dredged = 14,900 cu yd.

Activities Conducted:

- Arrival of capping material barge, and positioning within the inner containment area.

- Initiation of the capping process at 1200, continuing until ~1700. Capping material placement started at the "toe" of the dredge prism (bottom of slope) and progressed towards the shore. The thickness of the first layer of material was initially monitored with use of lead line (as shown in photos) to confirm desired application rate. A bathymetry survey is planned for Friday am. As may be discernible in the photos, the process contributes to turbidity.

- Collection of field and lab water quality samples subsequent to commencement of capping process. The highest downstream turbidity reading was 19 NTU at 1 foot off the bottom. A turbidy reading subsequently collected closer to the containment area (~ 50 from oil boom/skirt) was 13 NTU, at the bottom depth.

- Disassembly of barge water treatment system.

- Adjustment and maintenance of inner containment by divers.

Pictures of site activities are on the PMX FTP site.

Daily E-mail Update: 10/21/05

Sean/All,

Gasco Field Update - Friday 10/21/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued placing of the pilot cap from ~0800 to 1140. Second barge of capping material (pilot & fringe) arrived ~1300 with capping continuing from 1420 until completion of the pilot cap at 1455.

- A bathymetry survey was performed following placement of the pilot cap which showed some low areas (4" in some places), but that most of the slope received at least 12" of material. The bathymetry survey was augmented by having the divers conduct a manual grid survey of capping material depths (~10' by 20' grids). The divers measurements corrobortated the bathymetry survey. Lead line measurements were also utilized in ascertaining grade.

- Collection of field and lab water quality samples subsequent to commencement of capping process. The highest downstream turbidity readings typically range in the high teens.

- Additional disassembly of the bubble curtain piping.

- Adjustment and maintenance of inner containment by divers.

- Visit to site by EI representative, once in the am and once in the pm.

Issues:

None at this time.

Schedule:

Low lying areas within the pilot cap will be filled Saturday morning based on the bathymetry survey from Friday afternoon. Placement of fringe cap material along the shoreline cut-face is planned for Saturday in preparation for placing the clay mat on Sunday. Initial removal of portions of the silt curtain/baffle is also planned Saturday, continuing Sunday.

Pictures of site activities are on the PMX FTP site.

Daily E-mail Update: 10/22/05 & 10/23/05

Sean/All,

Gasco Field Update - Saturday 10/22/05 and Sunday 10/23/05
Andrew Somes - Parametrix Field Staff

Activities Conducted Saturday:

- Continued placment of pilot cap material (in low areas), and commencement of fringe material placement along shore in preparation of clay mat placement. As per EPA request, efforts were made during placement of the fringe material along the cut face such that there would be a bucket-wide swath of exposed sediment (or at least thinner layers of capping material) running the length of the cut-face at the leading edge of the clay mat. It is anticipated that this would allow the leading edge of the clay mat to come in contact with sediment, thus keying it into the sediments.

- A bathymetry survey was performed following placement of the pilot cap which showed all the slope covered with at least 12" of capping material. Material appears to have accumulated in some areas due to sloughing, resulting in thicker areas within the pilot cap.

- Collection of field and lab water quality samples subsequent to commencement of capping. Highest downstream turbidity readings typically range in the high teens.

- Removal of the downstream leg of the silt curtain, and pieces of the bubble curtain.

Activities Conducted Sunday:

- Additional placement of fringe material along shore and grading of the cut-face in preparation of clay mat placement (see photos). There is substantially less sheen being produced during the capping process than previously observed (see photos showing sorbent).

- Placement of the clay mat along the cut -face. The process went smoothly and quickly and involed placing two 75-foot rolls of 15'-wide mat. The upper edge of the mats were placed at elevations exceeding those of any visually contaminated material along the cut-face, and the ends of the mat overlaped by about 3 feet (manufacturer requires 1 foot). The mats were anchored with stakes (completed by diver, note surfacing bubbles in photos), sand bags and angular boulders, and then overlain with fringe material.

- Collection of field and lab water quality samples subsequent to commencement of capping process. The highest downstream turbidity readings ranged in the teens.

Issues: None at this time
Photos of site activities are on the Paramaterix ftp site.

Daily E-mail Update: 10/24/05

Sean/All,

Gasco Field Update - Monday 10/24/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued placment of fringe cap material, along the shore and in the western area of the inner containment.

- Bathymetry survey.

- Collection of field and lab water quality samples subsequent to commencement of capping process. Turbidity readings were lower than in previous days.

- Continued removal of the silt curtain, bed-load baffle and bubble curtain.

Issues:

None at this time.

Schedule:

Continued capping. Additional armor material being placed 10/25 and 10/26. Fringe capping to continue likely through Nov. 5th.

Photos of site activities are on the Parametrix ftp site

Daily E-mail Update: 10/25/05

Sean/All,

Gasco Field Update - Tuesday 10/25/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued placment of fringe cap material and armor material along the shore, and armor material in the dredge prism.

- Bathymetry survey.

- Collection of field and lab water quality samples subsequent to commencement of capping process. Turbidity readings were lower than in previous days.

- Completion of silt curtain, bed-load baffle and bubble curtain removal .

Issues:

None at this time.

Schedule:

Continued capping. Armour material being placed 10/26 with fringe capping likely to continue through Nov. 5th.

Photos of site activities are on the Paramaterix ftp site.

Daily E-mail Update: 10/26/05

Sean/All,

Gasco Field Update - Wednesday 10/26/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued placment of fringe cap and armor material.

- Bathymetry survey.

- Collection of field and lab water quality samples subsequent to commencement of capping process. Turbidity readings were low.

Issues:

None at this time.

Schedule:

Capping estimated to continue through the weekend and possible completion by Sunday October 30th. Independent bathymetry survey to be completed Monday 31st.

Photos of site activities are on the Paramaterix ftp site.

Daily E-mail Update: 10/27/05 & 10/28/05

Sean/All,

Gasco Field Update - Thursday 10/27/05 and Friday 10/28/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Continued placment of fringe cap.

- Bathymetry survey.

- Collection of field and lab water quality samples subsequent to commencement of capping process.

Issues:

None at this time.

Schedule:

Capping estimated to continue through the weekend and possible completion by Sunday October 30th. Independent bathymetry survey to be completed Monday 31st.

Photos of site activities are on the Parametrix ftp site.

Daily E-mail Update: 10/31/05

Sean/All,

Gasco Field Update - Monday 10/31/05
Andrew Somes - Parametrix Field Staff

Activities Conducted:

- Third-party bathymetry survey.

Issues:

None at this time.

Schedule:

Complete, pending review of bathymetry survey.

Photos of site activities are on the Parametrix ftp site.

Daily E-mail Update: 11/10/05 & 11/11/05

Sean/All,

Activities at the Gasco transfer facility at the Port of Morrow have generally been completed. All dredged material has been offloaded and transferred to Arlington. All barges and containers have been decontaminated and the transfer facility has been dismantled and demobilized. Parametrix field staff observed demobilization activities last Thursday and Friday and observations are below.

Gasco Field Update - Thursday 11/10/05 and Friday 11/11/05
Andrew Somes - Parametrix Field Staff, Transfer Facility

Activities Conducted Thursday:

- Demobilization of transfer facility. Tasks included decontamination of equipment (dredge bucket, loader, excavator, etc.) with steam cleaners, loading and hauling of final dredge material debris from site, removal and hauling of top soil in loading area, and pumping and hauling of baker tank and decontamination water. Steam cleaning of equipment was done in the barge with accumulated waste water contained and removed via vacuum truck.

Activities Conducted Friday:

- Continued demobilization of transfer facility, including loading and hauling of containment area debris (visqueen, logs, etc), steam cleaning of equipment, final grading and equipment loading.

- Collection of surface soil samples, in locations from where samples were collected at onset of project (west of loading area, and near exit).

Issues:

None at this time. Parametrix did not observe any areas of obvious visual contamination after the site had been cleaned and graded.

Photos of site activities are on the Paramatrix ftp site.

APPENDIX C

Photographic Documentation

Appendix C is supplied on the CD attached to the back cover of this report.

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APPENDIX D

Supporting Information

Table 3
Dredging Elutrate Test (DRET) Analytical Summary

Location ID Sample Date Depth Interval Sediment Zone	Units	Relevant Acute Water Quality Criteria	RAA-03 7/21/2004 5-13 ft Visually Cont.	RAA-11 7/22/2004 2-4 ft Tar Body	RAA-11 7/22/2004 4-13 ft Visually Cont.	RAA-13 7/20/2004 9-11 ft Tar Body
Sheen Visible in Elutriate Test Vessel?			No	Yes	No	Yes
Measurable Non-Aqueous Phase Layer?			No	No	No	No
Conventionals						
Cyanide	mg/l	0.022	0.01 U	0.01	0.01 U	0.01
Metals						
Arsenic (dissolved)	µg/l	340	2.3	0.7	0.5	0.8
Arsenic (total)	µg/l	340	3.5	0.8	0.8	1
Chromium (dissolved)	µg/l	16	0.31 J	0.4	0.32 J	0.35 J
Chromium (total)	µg/l	16	5.39	1.08	1.09	1.53
Copper (dissolved)	µg/l	13	13.1	1.66	2.27	1.06
Copper (total)	µg/l	13	16.5	2.07	2.29	3.77
Lead (dissolved)	µg/l	65	0.12	0.06	0.12	0.09
Lead (total)	µg/l	65	7.46	0.92	3.11	2.32
Nickel (dissolved)	µg/l	470	0.7	1.2	1.4	1.2
Nickel (total)	µg/l	470	4.4	1.9	2.1	2.1
Zinc (dissolved)	µg/l	120	2.7	1.2	1.5	2.7
Zinc (total)	µg/l	120	16.5	3.7	4.1	7.3
Total Petroleum Hydrocarbons (TPH)						
TPH - Diesel Range	µg/l	--	430 Z	17000 Z	240 J	13000 Z
TPH - Residual Range	µg/l	--	280 J	400 J	99 J	790 Z
Semi-Volatile Organic Compounds (SVOC)						
1,2,4-Trichlorobenzene	µg/l	--	0.20 U	3.9 U	0.20 U	20 U
1,2-Dichlorobenzene	µg/l	260	0.20 U	3.9 U	0.20 U	3.9 U
1,3-Dichlorobenzene	µg/l	630	0.20 U	3.9 U	0.20 U	3.9 U
1,4-Dichlorobenzene	µg/l	180	0.20 U	3.9 U	0.20 U	3.9 U
2,4,5-Trichlorophenol	µg/l	--	0.48 U	9.6 U	0.48 U	9.6 U
2,4,6-Trichlorophenol	µg/l	--	0.48 U	9.6 U	0.48 U	9.6 U
2,4-Dichlorophenol	µg/l	2,020	0.48 U	9.6 U	0.48 U	48 U
2,4-Dimethylphenol	µg/l	2,120	2.0 U	14 J	2.0 U	200 U
2,4-Dinitrophenol	µg/l		3.9 U	77 U	3.9 U	77 U
2,4-Dinitrotoluene	µg/l	330	0.20 U	3.9 U	0.20 U	3.9 U
2,6-Dinitrotoluene	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
2-Chloronaphthalene	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
2-Chlorophenol	µg/l	4,380	0.48 U	9.6 U	0.48 U	9.6 U
2-Methylnaphthalene	µg/l	--	0.030 J	470	0.050 J	710
2-Methylphenol	µg/l	230	0.48 U	3.3 J	0.48 U	1.6 J
2-Nitroaniline	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
2-Nitrophenol	µg/l	--	0.48 U	9.6 U	0.48 U	48 U
3,3'-Dichlorobenzidine	µg/l	--	2.0 U	39 U	2.0 U	39 U
3-Nitroaniline	µg/l	--	0.96 U	20 U	0.96 U	20 U
4,6-Dinitro-2-methylphenol	µg/l	--	2.0 U	39 U	2.0 U	39 U
4-Bromophenylphenylether	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
4-Chloro-3-methylphenol	µg/l	30	0.057 J	9.6 U	0.076 J	48 U
4-Chloroaniline	µg/l	--	0.20 U	3.9 U	0.20 U	20 U
4-Chlorophenyl-phenylether	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
4-Methylphenol	µg/l	--	0.48 U	15	0.48 U	12
4-Nitroaniline	µg/l	--	0.96 U	20 U	0.96 U	20 U
4-Nitrophenol	µg/l	230	2.0 U	39 U	2.0 U	39 U
Acenaphthene	µg/l	1,700	84	150	6.7	440
Acenaphthylene	µg/l	--	1.7	390	0.48	140
Anthracene	µg/l	13	0.12 J	41	1.2	58
Benzo(a)anthracene	µg/l	0.49	0.78	4.8	0.76	19
Benzo(a)pyrene	µg/l	0.24	0.55	4.6	1	24
Benzo(b)fluoranthene	µg/l	--	0.61	4.5	1	22
Benzo(g,h,i)perylene	µg/l	--	0.39	3.8 J	1	20
Benzo(k)fluoranthene	µg/l	--	0.21	1.4 J	0.39	6.9
Benzoic acid	µg/l	740	1.9 J	96 U	2.1 J	480 U
Benzyl alcohol	µg/l	150	4.8 U	96 U	4.8 U	96 U
bis(2-Chloroethoxy)methane	µg/l	--	0.20 U	3.9 U	0.20 U	20 U
bis(2-Chloroethyl)ether	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
bis(2-chloroisopropyl)ether	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
bis(2-Ethylhexyl)phthalate	µg/l	27	2.0 U	39 U	2.0 U	39 U
Butylbenzylphthalate	µg/l	--	0.028 J	3.9 U	0.027 J	3.9 U
Chrysene	µg/l	--	0.81	7.4	2.1	24
Dibenzo(a,h)anthracene	µg/l	--	0.037 J	3.9 U	0.086 J	1.8 J
Dibenzofuran	µg/l	66	0.044 J	23	0.072 J	28
Diethylphthalate	µg/l	1800	0.27	3.9 U	0.52	3.9 U
Dimethylphthalate	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U
Di-n-butylphthalate	µg/l	190	0.091 J	3.9 U	0.15 J	3.9 U
Di-n-octylphthalate	µg/l	--	0.39 U	7.7 U	0.39 U	7.7 U
Fluoranthene	µg/l	3,980	19	56	6.3	110
Fluorene	µg/l	70	0.078 J	130	0.32	150
Hexachlorobenzene	µg/l	--	0.20 U	3.9 U	0.20 U	3.9 U

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Location ID Sample Date Depth Interval Sediment Zone	Units	Relevant Acute Water Quality Criteria	RAA-03 7/21/2004 5-13 ft Visually Cont.	RAA-11 7/22/2004 2-4 ft Tar Body	RAA-11 7/22/2004 4-13 ft Visually Cont.	RAA-13 7/20/2004 9-11 ft Tar Body
Hexachlorobutadiene	µg/l	90	0.20 U	3.9 U	0.20 U	20 U
Hexachlorocyclopentadiene	µg/l	7	0.96 U	20 U	0.96 U	20 U
Hexachloroethane	µg/l	210	0.20 U	3.9 U	0.20 U	3.9 U
Indeno(1,2,3-cd)pyrene	µg/l	--	**0.36**	**3.2 J**	**0.83**	**17**
Isophorone	µg/l	117,000	0.20 U	3.9 U	0.20 U	20 U
Naphthalene	µg/l	190	**0.078 J**	**6900**	**0.27**	**11000**
Nitrobenzene	µg/l	27,000	0.20 U	3.9 U	0.20 U	3.9 U
N-Nitroso-di-n-propylamine	µg/l	5,850	0.20 U	3.9 U	0.20 U	3.9 U
n-Nitrosodiphenylamine	µg/l	3,800	0.20 U	3.9 U	0.20 U	3.9 U
Pentachlorophenol	µg/l	19	**0.072 J**	20 U	**0.071 J**	**2.0 J**
Phenanthrene	µg/l	--	**0.49**	**280**	**1**	**300**
Phenol	µg/l	10,200	**0.10 J**	**8.9 J**	**0.17 J**	**2.5 J**
Pyrene	µg/l	--	**20**	**58**	**6**	**110**
Volatile Organic Compounds (VOCs)						
1,1,1-Trichloroethane	µg/l	200	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2,2-Tetrachloroethane	µg/l	2,100	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane	µg/l	5,200	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichlorotrifluoroethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethane	µg/l	830	0.50 U	0.50 U	0.50 U	0.50 U
1,1-Dichloroethene	µg/l	450	0.50 U	0.50 U	0.50 U	0.50 U
1,2,3-Trichlorobenzene	µg/l	--	2.0 U	2.0 U	2.0 U	2.0 U
1,2,4-Trichlorobenzene	µg/l	700	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromo-3-chloropropane	µg/l	--	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dichlorobenzene	µg/l	260	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	µg/l	8,800	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloropropane	µg/l	23,000	0.50 U	0.50 U	0.50 U	0.50 U
1,3-Dichlorobenzene	µg/l	630	0.50 U	0.50 U	0.50 U	0.50 U
1,4-Dichlorobenzene	µg/l	180	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone (MEK)	µg/l	240,000	20 U	20 U	20 U	20 U
2-Hexanone	µg/l	1,800	20 U	20 U	20 U	20 U
4-Methyl-2-pentanone (MIBK)	µg/l	2,200	20 U	20 U	20 U	20 U
Acetone	µg/l	--	**24**	**53**	**25**	**8.4 J**
Benzene	µg/l	2,300	0.50 U	**810**	**0.26 J**	**220**
Bromochloromethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Bromodichloromethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Bromomethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Carbon disulfide	µg/l	17	0.50 U	**0.53**	0.50 U	0.50 U
Carbon tetrachloride	µg/l	180	0.50 U	0.50 U	0.50 U	0.50 U
Chlorobenzene	µg/l	1,100	0.50 U	0.50 U	0.50 U	**0.35 J**
Chloroethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Chloroform	µg/l	490	0.50 U	0.50 U	0.50 U	0.50 U
Chloromethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,2-Dichloroethene	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
cis-1,3-Dichloropropene	µg/l	6,060	0.50 U	0.50 U	0.50 U	0.50 U
Cyclohexane	µg/l	--	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Dichlorodifluoromethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Dichloromethane	µg/l	26,000	**0.66 J**	**0.67 J**	**0.53 J**	**0.90 J**
Ethylbenzene	µg/l	130	0.50 U	**62**	0.50 U	**290**
Isopropylbenzene	µg/l	--	2.0 U	**23**	**2.0 U**	**14**
m,p-Xylenes	µg/l	--	0.50 U	**210**	0.50 U	**210**
Methyl acetate	µg/l	--	1.0 U	1.0 U	1.0 U	1.0 U
Methyl cyclohexene	µg/l	--	1.0 U	1.0 U	1.0 U	1.0 U
Methyltert-butylether	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
o-Xylene	µg/l	--	0.50 U	**100**	0.50 U	**120**
Styrene	µg/l	--	0.50 U	**38**	0.50 U	0.50 U
Tetrachloroethene	µg/l	830	0.50 U	0.50 U	0.50 U	0.50 U
Toluene	µg/l	120	0.50 U	**320**	0.50 U	**160**
trans-1,2-Dichloroethene	µg/l	1,100	0.50 U	0.50 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	µg/l	0.99	0.50 U	0.50 U	0.50 U	0.50 U
Trichloroethene	µg/l	440	0.50 U	**0.15 J**	0.50 U	**0.17 J**
Trichlorofluoromethane	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U
Vinyl chloride	µg/l	--	0.50 U	0.50 U	0.50 U	0.50 U

Notes:

Yellow shading indicates value that exceeds acute criteria.

Detected values shown in bold

J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

U The compound was analyzed for, but was not detected at or above the MRL/MDL.

Z *The chromatographic fingerprint does not resemble a petroleum product.*

Water quality criteria from National Ambient Water Quality Criteria, Oregon proposed and existing regulations, and ORNL 1996.

-- Not Available

Table 3
Dredge Water Quality Kuo-Hayes Model Simulation Results

Distance from Dredge	50 ft			100 ft			200 ft			300 ft			400 ft			Acute
Percentile Result	50th	90th	95th	50th	90th	95th	50th	90th	95th	50th	90th	95th	50th	90th	95th	(µg/L)
Total Suspended Sediment Concentration (mg/L)	263	757	961	177	491	621	114	283	375	83	209	280	65	163	223	N/AV
DRET-Based Water Concentration Ratio (unitless) - As Compared to Acute Water Quality Criteria																
Copper	3.42E-02	1.07E-01	1.43E-01	2.29E-02	6.93E-02	9.26E-02	1.45E-02	4.25E-02	5.62E-02	1.06E-02	3.11E-02	4.11E-02	8.34E-03	2.40E-02	3.24E-02	13
Cyanide	6.03E-03	6.03E-03	6.03E-03	4.11E-03	4.11E-03	4.11E-03	2.69E-03	2.69E-03	2.69E-03	2.03E-03	2.03E-03	2.03E-03	1.63E-03	1.63E-03	1.63E-03	22
Anthracene	2.64E-02	8.81E-02	1.30E-01	1.78E-02	5.94E-02	8.60E-02	1.14E-02	3.63E-02	5.31E-02	8.11E-03	2.66E-02	3.92E-02	6.26E-03	2.16E-02	3.01E-02	13
Benzo(a)anthracene	3.41E-01	1.24E+00	1.65E+00	2.31E-01	7.82E-01	1.08E+00	1.45E-01	4.79E-01	6.48E-01	1.08E-01	3.51E-01	4.69E-01	8.46E-02	2.81E-01	3.71E-01	0.49
Benzo(a)pyrene	7.12E-01	2.45E+00	3.52E+00	4.86E-01	1.63E+00	2.28E+00	3.14E-01	1.03E+00	1.42E+00	2.32E-01	7.65E-01	1.03E+00	1.81E-01	6.02E-01	8.06E-01	0.24
Benzene	5.60E-04	5.60E-04	5.60E-04	3.81E-04	3.81E-04	3.81E-04	2.49E-04	2.49E-04	2.49E-04	1.89E-04	1.89E-04	1.89E-04	1.51E-04	1.51E-04	1.51E-04	2300
Fluoranthene	8.98E-04	3.32E-03	4.31E-03	5.92E-04	2.08E-03	2.83E-03	3.79E-04	1.29E-03	1.75E-03	2.81E-04	9.29E-04	1.31E-03	2.19E-04	7.43E-04	1.05E-03	3980
Fluorene	1.24E-02	4.34E-02	6.44E-02	8.39E-03	2.78E-02	3.97E-02	5.38E-03	1.70E-02	2.38E-02	3.96E-03	1.25E-02	1.70E-02	3.08E-03	9.76E-03	1.33E-02	70
Naphthalene	3.36E-02	1.21E-01	1.71E-01	2.28E-02	7.92E-02	1.14E-01	1.45E-02	4.79E-02	7.12E-02	1.03E-02	3.36E-02	5.49E-02	7.91E-03	2.60E-02	4.37E-02	2300
Ethylbenzene	1.57E-02	5.65E-02	7.70E-02	1.05E-02	3.69E-02	4.83E-02	6.60E-03	2.21E-02	3.04E-02	4.89E-03	1.58E-02	2.30E-02	3.82E-03	1.24E-02	1.80E-02	130
Toluene	1.77E-02	5.59E-02	7.52E-02	1.18E-02	3.66E-02	4.94E-02	7.57E-03	2.19E-02	3.04E-02	5.58E-03	1.62E-02	2.18E-02	4.27E-03	1.23E-02	1.78E-02	120
Sum of Ratios	1.20E+00	4.17E+00	5.84E+00	8.16E-01	2.73E+00	3.80E+00	5.22E-01	1.70E+00	2.33E+00	3.86E-01	1.25E+00	1.69E+00	3.01E-01	9.92E-01	1.33E+00	

Note:

DRET - Dredging Elutriate Test

Table 9
Offloading Facility Off-Site Tracking Soil Analytical Results

Location ID	GTM-01		GTM-02	
Sample ID	GTM-01SO-02	GTM-111S-0-0.3-TP	GTM-02SO-02	GTM-111S-0-0.3-RD
Sample Date	9/13/2005	11/11/2005	9/13/2005	11/11/2005
Depth Interval	0-10 cm	0-10 cm	0-10 cm	0-10 cm
Sample Description	Baseline	Post-Construction	Baseline	Post-Construction
Chemical Name				
Conventionals (%)				
Total Solids	–	**94.8**	**99.1**	**93.6**
Total Organic Carbon	**0.49 J**	**0.59**	**0.43 J**	**0.81**
SVOCs (µg/kg)				
2-Methylnaphthalene	**0.91 J**	**20**	**0.89 J**	**0.96 J**
Acenaphthene	**0.20 J**	**88**	**0.18 J**	2.7 U
Acenaphthylene	5.0 U	**65**	5.10 U	**0.29 J**
Anthracene	5.0 U	**180**	5.10 U	**0.33 J**
Benzo(a)anthracene	**1.60 J**	**300**	**1.40 J**	**2.3 J**
Benzo(a)pyrene	**1.40 J**	**420**	**1.80 J**	**2.8**
Benzo(b)fluoranthene	**3.00 J**	**310**	**5.00 J**	**4.1**
Benzo(g,h,i)perylene	**2.90 J**	**400**	**3.30 J**	**3.8**
Benzo(k)fluoranthene	**1.40 J**	**240**	**1.70 J**	**2.8**
Chrysene	**3.40 J**	**470**	**4.70 J**	**4.4**
Dibenzo(a,h)anthracene	**0.79 J**	**39**	**0.60 J**	**0.54 J**
Dibenzofuran	**0.84 J**	**8.1**	**0.60 J**	**0.42 J**
Fluoranthene	**3.90 J**	**1300**	**3.60 J**	**5.4**
Fluorene	5.0 U	**59**	5.1 U	**0.27 J**
Indeno(1,2,3-cd)pyrene	**1.60 J**	**370**	**2.00 J**	**3.0**
Naphthalene	5.0 U	**84**	5.1 U	**1.8 J**
Phenanthrene	5.0 U	**730**	5.1 U	**2.5 J**
Pyrene	**5.10**	**2000**	5.1 U	**6.0**

Notes:

Bold Analyte detected at provided concentration.

U Non-Detect

J Analyte estimated due to detection below instrument reporting limit

Table 15
Background Survey Water Quality Monitoring Results Compared to Triggers – Laboratory Parameters

Location ID Sample Depth Sample Date Chemical Name	Unit	Chronic Criteria	Acute Criteria	RAA-WBGUB Bottom Depth 8/17/2005 Background	RAA-WBGDB Bottom Depth 8/18/2005 Background	RAA-WBGDS Surface Depth 8/18/2005 Background	RAA-WBGUB Bottom Depth 8/18/2005 Background	RAA-WBGDB Bottom Depth 8/19/2005 Background	RAA-WBGDS Surface Depth 8/19/2005 Background
Conventionals									
Cyanide	µg/l	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U
SVOC									
Anthracene	µg/l	0.73	13	0.0188 U	**0.00561 J**	**0.00461 J**	**0.00646 J**	**0.00483 J**	**0.0055 J**
Benzo(a)anthracene	µg/l	0.02	0.49	0.0188 U	**0.0128 J**	**0.0112 J**	**0.00602 J**	0.0202 U	0.0211 U
Benzo(a)pyrene	µg/l	0.01	0.24	0.0188 U	**0.0532 ***	0.02 U	**0.0306**	**0.0485 ***	0.0211 U
Dibenzofuran	µg/l	3.7	66	0.188 U	0.218 U	0.20 U	0.188 U	0.202 U	0.211 U
Fluoranthene	µg/l	6.16	3980	**0.0123 J**	**0.0425**	**0.0233**	**0.0134 J**	**0.0398**	**0.0169 J**
Fluorene	µg/l	3.9	70	0.0188 U	**0.0126 J**	**0.0154 J**	**0.00807 J**	**0.00905 J**	**0.00663 J**
Naphthalene	µg/l	12	190	0.0471 U	**0.148**	**0.108**	**0.0193 J**	**0.0516**	**0.111**
Phenanthrene	µg/l	–	–	0.0188 U	**0.0382**	**0.0218**	**0.0148 J**	**0.0208**	**0.00869 J**

Notes:

µg/l micrograms per liter

U Non-detect

J Estimated, the result is below the reportnig limit and above the lab MDL.

* Exceedance of Chronic Criteria

Table 16
Additional Background Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-A-050916 9/16/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050916 9/16/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-050916 9/16/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-050916 9/16/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-050916 9/16/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-050916 9/16/2005 Bottom Depth	RAA-WCD5 RAA-WCD5-A-050916 9/16/2005 Surface Depth	RAA-WCD5 RAA-WCD5-B-050916 9/16/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.195	0.167	0.173	0.0763	0.0504	0.0789	0.121	0.22
Benzo(a)anthracene	0.02	0.49	0.137 *	0.219 J *	0.136 *	0.0485 *	0.0414 *	0.0688 *	0.0817 *	0.113 *
Benzo(a)pyrene	0.01	0.24	0.21 *	R	0.274 *	0.0963 J *	0.0846 *	0.151 J *	0.133 *	0.167 *
Dibenzofuran	3.7	66	0.191 U	0.0528 J	0.0214 J	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Fluoranthene	6.16	3980	0.481	0.54	0.523	0.138	0.136	0.248	0.276	0.38
Fluorene	3.9	70	0.114	0.294 J	0.111	0.045	0.042	0.0616	0.0807	0.115
Naphthalene	12	190	0.0862	0.0735	0.0423 J	0.234	0.21	0.229	0.328	0.371
Phenanthrene	–	–	0.409	0.652	0.343	0.166	0.161	0.314	0.312	0.425

Notes:

U Non-Detect

J Estimated, the result is below the reporting limit and above the lab MDL

Exceedance of Acute Criteria

Exceedance of Chronic Criteria

Table 16
Additional Background Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD5 RAA-WCD5-C-050916 9/16/2005 Bottom Depth	RAA-WCD6 RAA-WCD6-B-050916 9/16/2005 Mid Depth	RAA-WCD7 RAA-WCD7-B-050916 9/16/2005 Mid Depth	RAA-WCU1 RAA-WCU1-A-050916 9/16/2005 Surface Depth	RAA-WCU1 RAA-WCU1-B-050916 9/16/2005 Mid Depth	RAA-WCU1 RAA-WCU1-C-050916 9/16/2005 Bottom Depth	RAA-WCU2 RAA-WCU2-A-050916 9/16/2005 Surface Depth
Conventionals (µg/L)									
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOCs (µg/L)									
Anthracene	0.73	13	0.206	0.053	0.025	0.00546 J	0.00729 J	0.00586 J	0.00417 J
Benzo(a)anthracene	0.02	0.49	0.134 *	0.0395 *	0.0258 J *	0.00914 J	0.0103 J	0.00834 J	0.00686 J
Benzo(a)pyrene	0.01	0.24	0.475 J * #	0.0837 *	0.193 J *	0.0516 *	0.0193 UJ	0.0547 *	0.0495 *
Dibenzofuran	3.7	66	0.0249 J	0.19 U	0.194 UJ	0.19 U	0.193 U	0.196 U	0.191 U
Fluoranthene	6.16	3980	0.50	0.171	0.0614	0.0262	0.0311	0.0235	0.0168 J
Fluorene	3.9	70	0.14	0.033	0.0787 J	0.019 U	0.0193 U	0.0196 U	0.0191 U
Naphthalene	12	190	0.253	0.0416 J	0.17	0.0475 U	0.0483 U	0.0491 U	0.0477 U
Phenanthrene	–	–	0.463	0.0836	0.179	0.0142 J	0.025	0.0119 J	0.0132 J

Notes:

U Non-Detect

J Estimated, the result is below the reporting limit and above the lab MDL

* Exceedance of Acute Criteria

Exceedance of Chronic Criteria

Table 16
Additional Background Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU2 RAA-WCU2-B-050916 9/16/2005 Mid Depth	RAA-WCU2 RAA-WCU2-C-050916 9/16/2005 Bottom Depth	RAA-WCU3 RAA-WCU3-A-050916 9/16/2005 Surface Depth	RAA-WCU3 RAA-WCU3-B-050916 9/16/2005 Mid Depth	RAA-WCU3 RAA-WCU3-C-050916 9/16/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-050929-2 9/29/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050929-2 9/29/2005 Mid Depth
Conventionals (µg/L)									
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOCs (µg/L)									
Anthracene	0.73	13	0.00872 J	0.00697 J	0.0037 J	0.00558 J	0.00985 J	1.1 *	0.2 UJ
Benzo(a)anthracene	0.02	0.49	0.00675 J	0.00806 J	0.00734 J	0.0107 J	0.013 J	0.8 J * #	0.2 UJ
Benzo(a)pyrene	0.01	0.24	0.049 *	0.0498 *	0.0496 *	0.0512 *	0.0543 *	1.3 * #	0.2 UJ
Dibenzofuran	3.7	66	0.192 U	0.191 U	0.19 U	0.193 U	0.19 U	2.1 UJ	2 UJ
Fluoranthene	6.16	3980	0.0127 J	0.0139 J	0.0167 J	0.0236	0.0299	3.7 J	0.2 UJ
Fluorene	3.9	70	0.0192 U	0.0191 U	0.019 U	0.0193 U	0.00923 J	0.45	0.2 UJ
Naphthalene	12	190	0.048 U	0.0477 U	0.0475 U	0.0484 U	0.0289 J	0.52 U	0.5 UJ
Phenanthrene	–	–	0.00915 J	0.0083 J	0.0126 J	0.0137 J	0.0202	1.7 J	0.2 UJ

Notes:

U Non-Detect

J Estimated, the result is below the reporting limit and above the lab MDL

Exceedance of Acute Criteria

Exceedance of Chronic Criteria

Table 16
Additional Background Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID / Sample ID / Sample Date / Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-C-050929-2 9/29/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050929-1 9/29/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050929-1 9/29/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050929-1 9/29/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-050929-1 9/29/2005 Surface Depth	RAA-WCD4 RAA-WCD4-A-050929-2 9/29/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-050929-1 9/29/2005 Mid Depth	RAA-WCD4 RAA-WCD4-B-050929-2 9/29/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.99 *	0.94 *	0.2 U	0.19 U	0.85 J *	0.3	0.2 U	0.46
Benzo(a)anthracene	0.02	0.49	0.83 J * #	0.75 J * #	0.2 UJ	0.19 UJ	0.62 J * #	0.22 J *	0.2 UJ	0.31 J *
Benzo(a)pyrene	0.01	0.24	1.2 * #	1.1 * #	0.22 *	0.19 U	0.84 J * #	0.46 * #	0.24 *	0.61 * #
Dibenzofuran	3.7	66	1.9 UJ	2 UJ	2 UJ	1.9 UJ	2.1 UJ	2 UJ	2 UJ	2.2 UJ
Fluoranthene	6.16	3980	3.7 J	3.5 J	0.2 UJ	0.19 UJ	2.5 J	0.99 J	0.25 J	1.9 J
Fluorene	3.9	70	0.38	0.37	0.2 U	0.19 U	1.7 J	0.24	0.2 U	0.22
Naphthalene	12	190	0.48 U	0.5 U	0.5 U	0.48 U	110 J *	0.5 U	0.49 U	0.54 U
Phenanthrene	–	–	1.8 J	1.5 J	0.2 UJ	0.19 UJ	6 J	0.84 J	0.2 UJ	0.96 J

Notes:

U Non-Detect

J Estimated, the result is below the reporting limit and above the lab MDL

Exceedance of Acute Criteria

Exceedance of Chronic Criteria

Table 16
Additional Background Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD4 AA-WCD4-B-050929-2-DU 9/29/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-050929-1 9/29/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-C-050929-2 9/29/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-050929-1 9/29/2005 Inside Curtain	RAA-WCIN RAA-INSIDE-050929-2 9/29/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-050929-1 9/29/2005 Outside Curtain	RAA-WCOUT RAA-OUTSIDE-050929-2 9/29/2005 Outside Curtain	RAA-WCU RAA-WCU-A-050929-1 9/29/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.49	0.19 UJ	0.62	0.85 *	25 J * #	0.2 UJ	0.69 J	0.2 U
Benzo(a)anthracene	0.02	0.49	0.38 J *	0.19 UJ	0.44 J *	0.69 J * #	12 J * #	0.2 UJ	0.61 J * #	0.2 UJ
Benzo(a)pyrene	0.01	0.24	0.69 * #	0.19 UJ	0.72 * #	1.3 * #	16 J * #	0.36 J * #	1.4 J * #	0.2 U
Dibenzofuran	3.7	66	1.9 UJ	1.9 UJ	2 UJ	2.2 UJ	2.2 J	2 UJ	1.9 UJ	2 UJ
Fluoranthene	6.16	3980	1.8 J	0.19 UJ	1.9 J	7.5 J *	67 J *	1.1 J	2.8 J	0.2 UJ
Fluorene	3.9	70	0.29	0.19 UJ	0.34	0.22 U	32 J *	0.2 UJ	0.28 J	0.2 U
Naphthalene	12	190	0.49 U	0.48 UJ	0.5 U	0.55 U	2.6 J	0.5 UJ	0.48 UJ	0.51 U
Phenanthrene	–	–	1 J	0.19 UJ	1.1 UJ	0.68 J	66 J	0.29 J	1.7 J	0.2 UJ

Notes:

U Non-Detect

J Estimated, the result is below the reporting limit and above the lab MDL

Exceedance of Acute Criteria

Exceedance of Chronic Criteria

Table 16
Additional Background Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-050929-2 9/29/2005 Surface Depth	RAA-WCU RAA-WCU-B-050929-1 9/29/2005 Mid Depth	RAA-WCU RAA-WCU-B-050929-2 9/29/2005 Mid Depth	RAA-WCU RAA-WCU-C-050929-1 9/29/2005 Bottom Depth	RAA-WCU RAA-WCU-C-050929-2 9/29/2005 Bottom Depth
Conventionals (µg/L)							
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U
SVOCs (µg/L)							
Anthracene	0.73	13	0.2 U	0.2 U	0.2 U	0.19 U	0.2 U
Benzo(a)anthracene	0.02	0.49	0.2 UJ	0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ
Benzo(a)pyrene	0.01	0.24	0.2 U	0.2 U	0.2 U	0.19 U	0.2 U
Dibenzofuran	3.7	66	2 UJ	2 UJ	2 UJ	1.9 UJ	2 UJ
Fluoranthene	6.16	3980	0.2 UJ	0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ
Fluorene	3.9	70	0.2 U	0.2 U	0.2 U	0.19 U	0.2 U
Naphthalene	12	190	0.49 U	0.5 U	0.51 U	0.48 U	0.5 U
Phenanthrene	–	–	0.2 UJ	0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ

Notes:

U Non-Detect

J Estimated, the result is below the reporting limit and above the lab MDL

Exceedance of Acute Criteria

Exceedance of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-A-050907 9/7/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050907 9/7/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-050907 9/7/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050908 9/8/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050908 9/8/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050908 9/8/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-050909 9/9/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050909 9/9/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	2.06 *	2.64 *	3.76 *	0.739 *	1.63 *	5.53 *	0.591 J	0.33 J
Benzo(a)anthracene	0.02	0.49	1.42 * #	2.05 * #	2.65 * #	0.593 * #	1.28 * #	5.86 * #	0.385 *	0.267 *
Benzo(a)pyrene	0.01	0.24	2.01 * #	2.24 * #	2.89 * #	0.781 * #	1.79 * #	6.68 * #	1.15 J * #	0.859 J * #
Dibenzofuran	3.7	66	0.267	0.385 J	0.473	1.98 U	1.94 U	20.3 U	2.00 U	0.0425 J
Fluoranthene	6.16	3980	5.54	7.65 *	9.17 *	2.42	4.93	19.0 *	1.65	1.28
Fluorene	3.9	70	1.85	2.31	2.78	0.437	1.08	3.43	0.423	0.232
Naphthalene	12	190	22.7 *	35.4 *	45.8 *	4.41	10.8	31.5 *	0.501 U	0.127
Phenanthrene			10.4	14.6	17.9	3.35	8.46	29.5	1.40	0.795

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-C-050909 9/9/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050912 9/12/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050912 9/12/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050912 9/12/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-050913 9/13/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050913 9/13/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-050913 9/13/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050914 9/14/2005 Surface Depth
Conventionals (µg/L)										
Cyanide *	5.2	20	50 U	25 J * #	50 U	50 U	50 UJ	50 UJ	50 UJ	50 UJ
SVOC (µg/L)										
Anthracene	0.73	13	0.516 J	0.00715 J	0.0256 J	0.055 J	0.804 J *	10.3 J *	4.31 J *	7.41 J *
Benzo(a)anthracene	0.02	0.49	0.419 *	0.0221 U	0.024 *	0.0444 *	0.541 J * #	5.68 J * #	2.36 J * #	4.51 J * #
Benzo(a)pyrene	0.01	0.24	1.00 J * #	0.0164 J *	0.0342 *	0.0479 *	0.768 J * #	7.03 J * #	1.19 J * #	5.75 J * #
Dibenzofuran	3.7	66	2.00 U	0.221 U	0.202 U	0.197 U	0.163 J	0.419	0.215 J	0.701
Fluoranthene	6.16	3980	1.57	0.027	0.09	0.151	1.88 J	20.4 J *	7.87 J *	16.8 J *
Fluorene	3.9	70	0.288	0.0126 J	0.0269	0.0319	1.78 J	5.69 J *	2.81 J	5.11 J *
Naphthalene	12	190	0.501 U	0.0281 J	0.0665	0.0858	0.13 J	1.02 J	9.25 J	62.2 J *
Phenanthrene			1.24	0.0367	0.0835	0.133	1.11 J	22.8 J	7.42 J	29.2 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"# Exceedence of Acute Criteria

" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD2 RAA-WCD2-B-050914 9/14/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050914 9/14/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-050916 9/16/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050916 9/16/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-050916 9/16/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-050916 9/16/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-050916 9/16/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-050916 9/16/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 UJ	50 UJ	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	4.00 J *	6.82 J *	0.196	0.167	0.173	0.0763	0.0504	0.0789
Benzo(a)anthracene	0.02	0.49	2.23 J * #	4.26 J * #	0.137 *	0.219 J *	0.136 *	0.0485 *	0.0414 *	0.0686 *
Benzo(a)pyrene	0.01	0.24	3.18 J * #	5.36 J * #	0.21 *	R	0.274 * #	0.0963 J *	0.0848 *	0.151 J *
Dibenzofuran	3.7	66	0.376 J	0.678	0.191 U	0.0528 J	0.0214 J	0.19 U	0.19 U	0.19 U
Fluoranthene	6.16	3980	88.7 J *	15.4 J *	0.481	0.54	0.523	0.138	0.136	0.248
Fluorene	3.9	70	2.58 J	4.63 J *	0.114	0.294 J	0.111	0.045	0.042	0.0616
Naphthalene	12	190	16.9 J *	47.5 J *	0.0862	0.0735	0.0423 J	0.234	0.21	0.229
Phenanthrene			16.1 J	27.1 J	0.409	0.552	0.343	0.166	0.161	0.314

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL.

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD5 RAA-WCD5-A-050916 9/16/2005 Surface Depth	RAA-WCD5 RAA-WCD5-B-050916 9/16/2005 Mid Depth	RAA-WCD5 RAA-WCD5-C-050916 9/16/2005 Bottom Depth	RAA-WCD6 RAA-WCD6-B-050916 9/16/2005 Mid Depth	RAA-WCD7 RAA-WCD7-B-050916 9/16/2005 Mid Depth	RAA-WCU1 RAA-WCU1-A-050916 9/16/2005 Surface Depth	RAA-WCU1 RAA-WCU1-B-050916 9/16/2005 Mid Depth	RAA-WCU1 RAA-WCU1-C-050916 9/16/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	0.121	0.22	0.206	0.053	0.025	0.00546 J	0.00729 J	0.00586 J
Benzo(a)anthracene	0.02	0.49	0.0817 *	0.113 *	0.134 *	0.0395 *	0.0258 J *	0.00914 J	0.0103 J	0.00834 J
Benzo(a)pyrene	0.01	0.24	0.133 *	0.167 *	0.476 J * #	0.0837 *	0.193 J *	0.0516 *	0.0193 UJ	0.0547 *
Dibenzofuran	3.7	66	0.19 U	0.19 U	0.0249 J	0.19 U	0.194 UJ	0.19 U	0.193 U	0.196 U
Fluoranthene	6.16	3980	0.276	0.38	0.50	0.171	0.0614	0.0262	0.0311	0.0235
Fluorene	3.9	70	0.0507	0.115	0.14	0.033	0.0787 J	0.019 U	0.0193 U	0.0196 U
Naphthalene	12	190	0.328	0.371	0.253	0.0416 J	0.17	0.0475 U	0.0483 U	0.0491 U
Phenanthrene			0.312	0.425	0.463	0.0836	0.179	0.0142 J	0.025	0.0119 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

\# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU2 RAA-WCU2-A-050916 9/16/2005 Surface Depth	RAA-WCU2 RAA-WCU2-B-050916 9/16/2005 Mid Depth	RAA-WCU2 RAA-WCU2-C-050916 9/16/2005 Bottom Depth	RAA-WCU3 RAA-WCU3-A-050916 9/16/2005 Surface Depth	RAA-WCU3 RAA-WCU3-B-050916 9/16/2005 Mid Depth	RAA-WCU3 RAA-WCU3-C-050916 9/16/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-050919 9/19/2005 Surface Depth	RAA-WCD8 RAA-WCD8-B-050919 9/19/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	**0.00417 J**	**0.00872 J**	**0.00697 J**	**0.0037 J**	**0.00558 J**	**0.00985 J**	**0.00371 J**	**0.0286**
Benzo(a)anthracene	0.02	0.49	**0.00686 J**	**0.00675 J**	**0.00806 J**	**0.00734 J**	**0.0107 J**	**0.013 J**	**0.00699 J**	**0.0153 J**
Benzo(a)pyrene	0.01	0.24	**0.0495 ***	**0.049 ***	**0.0498 ***	**0.0496 ***	**0.0512 ***	**0.0543 ***	**0.0497 ***	**0.0591 ***
Dibenzofuran	3.7	66	0.191 U	0.192 U	0.191 U	0.19 U	0.193 U	0.19 U	0.202 U	0.202 U
Fluoranthene	6.16	3980	**0.0168 J**	**0.0127 J**	**0.0139 J**	**0.0167 J**	**0.0236**	**0.0299**	**0.0107 J**	**0.066**
Fluorene	3.9	70	0.0191 U	0.0192 U	0.0191 U	0.019 U	0.0193 U	**0.00923 J**	0.0202 U	**0.0265**
Naphthalene	12	190	0.0477 U	0.048 U	0.0477 U	0.0475 U	0.0484 U	**0.0289 J**	**0.0197 J**	**0.241**
Phenanthrene			**0.0132 J**	**0.00915 J**	**0.0083 J**	**0.0125 J**	**0.0137 J**	**0.0202**	**0.0133 J**	**0.101**

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab *MDL*

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

***** Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD8 RAA-WCD8-C-050919 9/19/2005 Bottom Depth	RAA-WCU5 RAA-WCU5-A-050919 9/19/2005 Surface Depth	RAA-WCU5 RAA-WCU5-B-050919 9/19/2005 Mid Depth	RAA-WCU5 RAA-WCU5-B-050919-DUP 9/19/2005 Mid Depth	RAA-WCU5 RAA-WCU5-C-050919 9/19/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050920 9/20/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050920 9/20/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050920 9/20/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	0.0143 J	0.0747	1.27 *	0.166	0.257	0.241	1.64 *	0.584
Benzo(a)anthracene	0.02	0.49	0.0221 J *	0.043 *	0.678 * #	0.107 *	0.143 *	0.101 *	0.882 * #	0.318 *
Benzo(a)pyrene	0.01	0.24	0.0866 J *	0.0983 *	1.00 * #	0.194 *	0.212 *	0.162 *	1.59 J * #	0.42 * #
Dibenzofuran	3.7	66	0.196 UJ	0.201 U	0.0976 J	0.205 U	0.0241 J	0.20 U	0.172 J	0.0579 J
Fluoranthene	6.16	3980	0.0545	0.164	2.29	0.408	0.552	0.376	3.31	1.28
Fluorene	3.9	70	0.0404 J	0.0525	0.766	0.138	0.169	0.123	1.25	0.445
Naphthalene	12	190	0.162	1.01	11.9	2.28	2.81	1.88	22.3 *	8.20
Phenanthrene			0.105	0.276	4.29	0.665	0.878	0.614	6.14	2.16

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-050920 9/20/2005 Surface Depth	RAA-WCU RAA-WCU-B-050920 9/20/2005 Mid Depth	RAA-WCU RAA-WCU-C-050920 9/20/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050921 9/21/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050921 9/21/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050921 9/21/2005 Bottom Depth	RAA-WCU RAA-WCU-A-050921 9/21/2005 Surface Depth	RAA-WCU RAA-WCU-B-050921 9/21/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	0.0207 J	0.0335	0.0289	1.98 J *	1.74 J *	4.36 J *	0.0185 J	0.0468 J
Benzo(a)anthracene	0.02	0.49	0.0133 J	0.0223 *	0.022 *	1.32 J * #	1.14 J * #	2.76 J * #	0.0136 J	0.0185 J
Benzo(a)pyrene	0.01	0.24	0.0641 *	0.0703 J *	0.0712 *	1.58 J * #	1.33 J * #	5.94 J * #	0.093 J *	0.0614 J *
Dibenzofuran	3.7	66	0.221 U	0.213 U	0.211 U	0.182 J	0.145 J	1.14 J	0.213 U	0.204 UJ
Fluoranthene	6.16	3980	0.0484	0.0705	0.0808	4.02 J	3.74 J	11.3 J *	0.0562 J	0.0662 J
Fluorene	3.9	70	0.0193 J	0.0279	0.0262	1.39	1.16	3.61	0.0326	0.0408 J
Naphthalene	12	190	0.184	0.262	0.27	16.8 *	14.0 *	42.8 *	0.391	0.667 J
Phenanthrene			0.0746	0.111	0.111	7.68 J	6.70 J	20.2 J	0.0903 J	0.156 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-C-050921 9/21/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-050923 9/23/2005 Surface Depth	RAA-WCD8 RAA-WCD8-B-050923 9/23/2005 Mid Depth	RAA-WCD8 RAA-WCD8-C-050923 9/23/2005 Bottom Depth	RAA-WCU5 RAA-WCU5-A-050923 9/23/2005 Surface Depth	RAA-WCU5 RAA-WCU5-B-050923 9/23/2005 Mid Depth	RAA-WCU5 RAA-WCU5-C-050923 9/23/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-050926-RINS 9/26/2005 Rinsate Blank
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	0.0285 J	0.0184 J	0.0177 J	0.0413	0.615	0.498	0.424	0.0163 J
Benzo(a)anthracene	0.02	0.49	0.0175 J	0.0497 *	0.0496 J *	0.0607 *	0.431 J *	0.338 J *	0.276 *	0.0208 U
Benzo(a)pyrene	0.01	0.24	0.0651 J *	0.0699 J *	0.0742 *	0.0836 J *	0.556 J * #	0.428 J * #	0.359 J * #	0.0208 UJ
Dibenzofuran	3.7	66	0.206 U	0.193 U	0.192 U	0.194 U	0.0616 J	0.051 J	0.0521 J	0.208 U
Fluoranthene	6.16	3980	0.0611 J	0.0526	0.0529	0.117	1.64	1.36	1.02	0.0198 J
Fluorene	3.9	70	0.0241	0.0108 J	0.0115 J	0.0162 J	0.455	0.391	0.339	0.0152 J
Naphthalene	12	190	0.181	0.034 J	0.0231 J	0.0334 J	3.88	3.65	3.69	0.114
Phenanthrene			0.0791 J	0.0324	0.0283	0.0536	2.16	1.81	1.53	0.0791 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD2 RAA-WCD2-A-050926 9/26/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050926 9/26/2005 Mid Depth	RAA-WCD2 RAA-WCD2-B-050926 DUP 9/26/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-050926 9/26/2005 Bottom Depth	RAA-WCU RAA-WCU-A-050926 9/26/2005 Surface Depth	RAA-WCU RAA-WCU-B-050926 9/26/2005 Mid Depth	RAA-WCU RAA-WCU-C-050926 9/26/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-050927 9/27/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	2.97 *	2.91 *	3.17 *	2.31 *	0.0141 J	0.00755 J	0.0307	0.0317
Benzo(a)anthracene	0.02	0.49	1.89 * #	2.22 * #	2.13 * #	1.92 J * #	0.0142 J	0.0191 UJ	0.0136 J	0.0158 J
Benzo(a)pyrene	0.01	0.24	2.48 J * #	2.77 J * #	2.76 J * #	3.41 J * #	0.0791 J *	0.0191 UJ	0.0723 J *	0.0772 *
Dibenzofuran	3.7	66	0.338	0.341	0.385	0.751	0.198 U	0.191 UJ	0.193 U	0.203 U
Fluoranthene	6.16	3980	7.00 J *	9.41 J *	7.56 J *	1.92 J	0.0325 J	0.0191 UJ	0.0614 J	0.127
Fluorene	3.9	70	2.25	2.72	25.1 *	2.50 J	0.0454	0.0569 J	0.0231	0.0848
Naphthalene	12	190	30.2 *	15.4 *	35.2 *	30.8 *	0.478	0.0168 J	0.0242 J	1.08 J
Phenanthrene			11.2 J	14.2 J	12.7 J	13.3 J	0.0828 J	0.118 J	0.0909 J	0.246

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD8 RAA-WCD8-B-050927 9/27/2005 Mid Depth	RAA-WCD8 RAA-WCD8-B-050927DUP 9/27/2005 Mid Depth	RAA-WCD8 RAA-WCD8-C-050927 9/27/2005 Bottom Depth	RAA-WCIN RAA-INSIDE1-B-050927 9/27/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE1-B-050927 9/27/2005 Outside Curtain	RAA-WCU3 RAA-WCU3-A-050927 9/27/2005 Surface Depth	RAA-WCU3 RAA-WCU3-B-050927 9/27/2005 Mid Depth
Conventionals (µg/L)									
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)									
Anthracene	0.73	13	0.0222	0.0379	0.0452	29.0 * #	0.363	0.091	0.0225
Benzo(a)anthracene	0.02	0.49	0.0122 J	0.0235 J *	0.0289 *	9.53 * #	0.241 *	0.0491 *	0.0127 J
Benzo(a)pyrene	0.01	0.24	0.0732 *	1.67 J * #	0.095 *	16.6 * #	0.328 * #	0.114 *	0.0728 *
Dibenzofuran	3.7	66	0.203 U	0.249 U	0.21 U	7.31 J *	0.0567 J	0.0354 J	0.199 U
Fluoranthene	6.16	3980	0.0701	0.148	0.155	59.7 *	1.03	0.253	0.0715
Fluorene	3.9	70	0.0446	0.0927	0.0738	52.1 *	0.392	0.103	0.0439
Naphthalene	12	190	0.537 J	1.14 J	0.875 J	584 J * #	3.77 J	0.966 J	0.54 J
Phenanthrene			0.126	0.271	0.217	165	1.50	0.359	0.123

Notes:

µg/l *Micrograms per liter*

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

\# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
***Water Quality Monitoring* Results Compared to Triggers—Laboratory Parameters**

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU3 RAA-WCU3-C-050927 9/27/2005 Bottom Depth	RAA-WCU4 RAA-WCU4-A-050927 9/27/2005 Surface Depth	RAA-WCU4 RAA-WCU4-C-050927 9/27/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-050929-2 9/29/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050929-2 9/29/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-050929-2 9/29/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-050929-1 9/29/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-050929-1 9/29/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)										
Anthracene	0.73	13	0.118	0.204	0.122	1.1 *	0.2 UJ	0.99 *	0.94 *	0.2 U
Benzo(a)anthracene	0.02	0.49	0.0795 *	0.108 *	0.0869 *	0.8 J * #	0.2 UJ	0.83 J * #	0.75 J * #	0.2 UJ
Benzo(a)pyrene	0.01	0.24	0.174 *	0.176 *	0.169 *	1.3 * #	0.2 UJ	1.2 * #	1.1 * #	0.22 *
Dibenzofuran	3.7	66	0.0731 J	0.0425 J	0.204 U	2.1 UJ	2 UJ	1.9 UJ	2 UJ	2 UJ
Fluoranthene	6.16	3980	0.397	0.46	0.374	3.7 J	0.2 UJ	3.7 J	3.5 J	0.2 UJ
Fluorene	3.9	70	0.15	0.166	0.123	0.45	0.2 UJ	0.38	0.37	0.2 U
Naphthalene	12	190	1.52 J	1.49 J	1.10 J	0.52 U	0.5 UJ	0.48 U	0.5 U	0.5 U
Phenanthrene			0.538	0.613	0.454	1.7 J	0.2 UJ	1.8 J	1.5 J	0.2 UJ

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

\# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD2 RAA-WCD2-C-050929-1 9/29/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-050929-1 9/29/2005 Surface Depth	RAA-WCD4 RAA-WCD4-A-050929-2 9/29/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-050929-1 9/29/2005 Mid Depth	RAA-WCD4 RAA-WCD4-B-050929-2 9/29/2005 Mid Depth	RAA-WCD4 RAA-WCD4-B-050929-2-DUP 9/29/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-050929-1 9/29/2005 Bottom Depth
Conventionals (µg/L)									
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)									
Anthracene	0.73	13	0.19 U	0.85 J *	0.3	0.2 U	0.46	0.49	0.19 UJ
Benzo(a)anthracene	0.02	0.49	0.19 UJ	0.62 J * #	0.22 J *	0.2 UJ	0.31 J *	0.38 J *	0.19 UJ
Benzo(a)pyrene	0.01	0.24	0.19 U	0.84 J * #	0.46 * #	0.24 *	0.61 * #	0.69 * #	0.19 UJ
Dibenzofuran	3.7	66	1.9 UJ	2.1 UJ	2 UJ	2 UJ	2.2 UJ	1.9 UJ	1.9 UJ
Fluoranthene	6.16	3980	0.19 UJ	2.5 J	0.99 J	0.25 J	1.9 J	1.8 J	0.19 UJ
Fluorene	3.9	70	0.19 U	1.7 J	0.24	0.2 U	0.22	0.29	0.19 UJ
Naphthalene	12	190	0.48 U	110 J *	0.5 U	0.49 U	0.54 U	0.49 U	0.48 UJ
Phenanthrene			0.19 UJ	6 J	0.84 J	0.2 UJ	0.96 J	1 J	0.19 UJ

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD4 RAA-WCD4-C-050929-2 9/29/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-050929-1 9/29/2005 Inside Curtain	RAA-WCIN RAA-INSIDE-050929-2 9/29/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-050929-1 9/29/2005 Outside Curtain	RAA-WCOUT RAA-OUTSIDE-050929-2 9/29/2005 Outside Curtain	RAA-WCU RAA-WCU-A-050929-1 9/29/2005 Surface Depth	RAA-WCU RAA-WCU-A-050929-2 9/29/2005 Surface Depth
Conventionals (µg/L)									
Cyanide	5.2	20	50 U	50 U	50 U	50 U	50 U	50 U	50 U
SVOC (µg/L)									
Anthracene	0.73	13	0.62	0.85 *	25 J * #	0.2 UJ	0.69 J	0.2 U	0.2 U
Benzo(a)anthracene	0.02	0.49	0.44 J *	0.89 J * #	12 J * #	0.2 UJ	0.61 J * #	0.2 UJ	0.2 UJ
Benzo(a)pyrene	0.01	0.24	0.72 * #	1.3 * #	16 J * #	0.36 J * #	1.4 J * #	0.2 U	0.2 U
Dibenzofuran	3.7	66	2 UJ	2.2 UJ	2.2 J	2 UJ	1.9 UJ	2 UJ	2 UJ
Fluoranthene	6.16	3980	1.9 J	7.5 J *	67 J *	1.1 J	2.8 J	0.2 UJ	0.2 UJ
Fluorene	3.9	70	0.34	0.22 U	32 J *	0.2 UJ	0.28 J	0.2 U	0.2 U
Naphthalene	12	190	0.5 U	0.55 U	2.6 J	0.5 UJ	0.48 UJ	0.51 U	0.49 U
Phenanthrene			1.1 UJ	0.68 J	66 J	0.29 J	1.7 J	0.2 UJ	0.2 UJ

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-B-050929-1 9/29/2005 Mid Depth	RAA-WCU RAA-WCU-B-050929-2 9/29/2005 Mid Depth	RAA-WCU RAA-WCU-C-050929-1 9/29/2005 Bottom Depth	RAA-WCU RAA-WCU-C-050929-2 9/29/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-050930 9/30/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-050930 9/30/2005 Mid Depth	RAA-WCD1 RAA-WCD1-B-050930-DUP 9/30/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-050930 9/30/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	50 U	50 U	50 U	50 U	5.8 J *	5.6 U	5.6 U	5.8 J *
SVOC (µg/L)										
Anthracene	0.73	13	0.2 U	0.2 U	0.19 U	0.2 U	0.36 J	0.91 *	1.1 *	0.97 *
Benzo(a)anthracene	0.02	0.49	0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ	0.26 J *	0.68 * #	0.82 * #	0.76 * #
Benzo(a)pyrene	0.01	0.24	0.2 U	0.2 U	0.19 U	0.2 U	0.45 J * #	1.1 * #	1.2 * #	1.1 * #
Dibenzofuran	3.7	66	2 UJ	2 UJ	1.9 UJ	2 UJ	0.2 UJ	0.2 U	0.19 U	0.2 U
Fluoranthene	6.16	3980	0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ	1.3 J	3	3.6	3.4
Fluorene	3.9	70	0.2 U	0.2 U	0.19 U	0.2 U	0.093 J	0.27	0.33	0.32
Naphthalene	12	190	0.5 U	0.51 U	0.48 U	0.5 U	0.058 J	0.15	0.2	0.16
Phenanthrene			0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ	0.35 J	0.89	0.98	0.98

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

*# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17

Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD4 RAA-WCD4-A-050930 9/30/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-050930 9/30/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-050930 9/30/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-050930 9/30/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-050930 9/30/2005 Outside Curtain	RAA-WCU RAA-WCU-A-050930 9/30/2005 Surface Depth	RAA-WCU RAA-WCU-B-050930 9/30/2005 Mid Depth	RAA-WCU RAA-WCU-C-050930 9/30/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	14 *	11 *	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	0.59	0.02 UJ	0.87 *	9.7 *	0.047 J	0.2 U	0.2 U	0.2 U
Benzo(a)anthracene	0.02	0.49	0.37 *	0.02 UJ	0.65 * #	7.8 * #	0.039 J *	0.2 U	0.2 U	0.2 U
Benzo(a)pyrene	*0.01*	*0.24*	0.57 * #	0.026 J *	0.99 * #	11 * #	0.11 J *	0.27 * #	0.24 *	0.21 *
Dibenzofuran	3.7	66	0.2 U	0.2 UJ	0.2 U	0.19 U	0.19 UJ	2 U	2 U	2 U
Fluoranthene	6.16	3980	1.7	0.02 J	3	36 *	0.17 J	0.2 U	0.2 U	0.2 U
Fluorene	3.9	70	0.31	0.02 UJ	0.38	0.73	0.019 UJ	0.25	0.2 U	0.2 U
Naphthalene	12	190	0.11	0.049 UJ	0.13	1.4	0.048 UJ	0.5 U	0.5 U	0.49 U
Phenanthrene			0.8	0.02 UJ	0.9	5.1	0.052 J	0.44	0.2 U	0.2 U

Notes:

ug/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the *lab MDL*

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-A-051003 10/3/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051003 10/3/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051003 10/3/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-051003 10/3/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-051003 10/3/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-051003 10/3/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051003 10/3/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051003 10/3/2005 Outside Curtain
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	2.1 *	2.2 *	0.79 *	2 *	2.4 *	0.57 J	22 * #	4.6 *
Benzo(a)anthracene	0.02	0.49	1.2 * #	1.1 * #	0.48 *	1.1 * #	1.4 * #	0.26 J *	9.5 * #	2.5 * #
Benzo(a)pyrene	0.01	0.24	1.5 * #	1.4 * #	0.82 * #	1.4 * #	1.8 * #	0.37 J * #	9.9 * #	3.3 * #
Dibenzofuran	3.7	66	0.2 U	0.2 U	0.2 U	0.19 U	0.2 U	0.2 UJ	2.2	0.42
Fluoranthene	6.16	3980	5	4.7	1.7	4.5	6	1 J	39 *	9.2 *
Fluorene	3.9	70	1.4	1.2	0.53	1.3	1.4	0.32 J	15 *	3.4
Naphthalene	12	190	25 *	26 *	12	18 *	26 *	6.1 J	280 * #	60 *
Phenanthrene			8.5	8.2	3.7	7.2	9.5	1.7 J	81	15

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E *Over range, the analyte was detected above the linear* range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

\# *Exceedence of Acute Criteria*

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-051003 10/3/2005 Surface Depth	RAA-WCU RAA-WCU-B-051003 10/3/2005 Mid Depth	RAA-WCU RAA-WCU-B-051003-DUP 10/3/2005 Mid Depth	RAA-WCU RAA-WCU-C-051003 10/3/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051005 10/4/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051005 10/4/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051005 10/4/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-051005 10/4/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	0.019 U	0.036	0.023	0.02 U	1.6 J *	2 J *	1.2 *	0.76 *
Benzo(a)anthracene	0.02	0.49	0.019 U	0.027 *	0.02 U	0.02 U	1 J * #	1.6 J * #	0.82 * #	0.43 *
Benzo(a)pyrene	0.01	0.24	0.019 U	0.033 *	0.029 *	0.026 *	1.3 J * #	4.1 J * #	1 * #	0.52 * #
Dibenzofuran	3.7	66	0.19 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.3 J	0.2 U	0.21 U
Fluoranthene	6.16	3980	0.019 U	0.1	0.021	0.042	3.2	5	2.7	1.8
Fluorene	3.9	70	0.019 U	0.025	0.035	0.02 U	1.2 J	1.9 J	0.96	0.77
Naphthalene	12	190	0.06	0.38	1.8	0.05 U	14 *	15 *	8.5	8.1
Phenanthrene			0.019 U	0.14	0.089	0.02 U	5.1	7.2	3.7	2.7

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

*# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD4 RAA-WCD4-B-051005 10/4/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-051005 10/4/2005 Bottom Depth	RAA-WCN RAA-INSIDE-051005 10/4/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051005 10/4/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051005 10/4/2005 Surface Depth	RAA-WCU RAA-WCU-B-051005 10/4/2005 Mid Depth	RAA-WCU RAA-WCU-B-051005-DUP 10/4/2005 Mid Depth	RAA-WCU RAA-WCU-C-051005 10/4/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.7 J *	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	1.7 *	1.5 J *	7.6 *	0.83 *	0.021 U	0.02 U	0.02 UJ	1.2 *
Benzo(a)anthracene	0.02	0.49	1.1 J * #	0.96 J * #	3.6 * #	0.48 *	0.021 U	0.02 U	0.02 UJ	0.72 J * #
Benzo(a)pyrene	0.01	0.24	1.3 J * #	1.4 J * #	4.4 * #	0.62 * #	0.032 *	0.023 *	0.11 J *	0.89 J * #
Dibenzofuran	3.7	66	0.2 U	0.2 UJ	1.5	0.19 U	0.21 U	0.2 U	0.2 UJ	0.2 U
Fluoranthene	6.16	3980	3.6	3.3	19 *	2	0.032	0.028	0.02 J	2.8
Fluorene	3.9	70	1.3	1.1 J	10 *	0.91	0.021 U	0.02 U	0.02 UJ	1.3
Naphthalene	12	190	13 *	12	43 *	10	0.053 U	0.049 U	0.05 U	14 *
Phenanthrene			5.4	4.9	28	3	0.027	0.02	0.036 J	4.3

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J *Estimated, the result is below the reporting limit and above the lab MDL*

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-A-051006 10/6/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051006 10/6/2005 Mid Depth	RAA-WCD1 RAA-WCD1-B-051006-DUP 10/6/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051006 10/6/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-051006 10/6/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-051006 10/6/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-051006 10/6/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051006 10/6/2005 Inside Curtain
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	0.21 J	0.47	0.36	0.51	0.31 J	–	0.25	2.8 *
Benzo(a)anthracene	0.02	0.49	0.15 J *	0.3 *	0.26 *	0.41 *	0.34 J *	–	0.24 *	2.2 * #
Benzo(a)pyrene	0.01	0.24	0.21 J *	0.39 * #	0.36 * #	0.52 * #	0.29 J * #	–	1.8 * #	2.2 * #
Dibenzofuran	3.7	66	0.2 UJ	0.21 U	0.21 U	0.2 U	0.2 UJ	–	0.2 U	0.4
Fluoranthene	6.16	3980	0.57 J	1.1	0.97	1.3	0.75 J	–	0.83	6.4 *
Fluorene	3.9	70	0.14 J	0.36	0.26	0.38	0.17 J	–	0.29	3.3
Naphthalene	12	190	1.3 J	3.3	2.9	2.7	2.1 J	–	2.1	14 *
Phenanthrene			0.8 J	1.6	1.4	2.1	1.1 J	–	1.3	9.8

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

2 *See Case Narrative.*

"# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCOUT RAA-OUTSIDE-051006 10/6/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051006 10/6/2005 Surface Depth	RAA-WCU RAA-WCU-B-051006 10/6/2005 Mid Depth	RAA-WCU RAA-WCU-C-051006 10/6/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051011 10/11/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051011 10/11/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051011 10/11/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-051011 10/11/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	1.8 *	0.02 U	0.02 U	0.02 U	0.019 UJ	0.025 J	0.019 UJ	0.023 J
Benzo(a)anthracene	0.02	0.49	1.5 * #	0.02 UJ	0.02 UJ	0.02 UJ	0.019 UJ	0.025 J *	0.019 UJ	0.02 UJ
Benzo(a)pyrene	0.01	0.24	1.4 * #	0.02 U	0.02 U	0.021 J *	0.028 J *	0.043 J *	0.033 J *	0.035 J *
Dibenzofuran	3.7	66	0.19 U	0.2 U	0.2 U	0.2 U	0.19 UJ	0.19 UJ	0.19 UJ	0.2 UJ
Fluoranthene	6.16	3980	3.7	0.022	0.02 U	0.02 U	0.061 J	0.098 J	0.065 J	0.075 J
Fluorene	3.9	70	1.3	0.02 U	0.02 U	0.02 U	0.019 UJ	0.031 J	0.022 J	0.021 J
Naphthalene	12	190	12	0.049 U	0.05 U	0.049 U	0.077	0.17	0.091	0.065
Phenanthrene			5.2	0.02	0.02 U	0.02 U	0.052 J	0.086 J	0.055 J	0.053 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD4 RAA-WCD4-B-051011 10/11/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-051011 10/11/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051011 10/11/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051011 10/11/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051011 10/11/2005 Surface Depth	RAA-WCU RAA-WCU-B-051011 10/11/2005 Mid Depth	RAA-WCU RAA-WCU-C-051011 10/11/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-051012 10/12/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	0.023 J	0.03 J	0.47 J	0.093 J	0.019 UJ	0.019 UJ	0.019 UJ	0.022 U
Benzo(a)anthracene	0.02	0.49	0.019 UJ	0.022 J *	0.67 J * #	0.1 J *	0.019 UJ	0.019 UJ	0.019 UJ	0.022 U
Benzo(a)pyrene	0.01	0.24	0.029 J *	0.041 J *	0.67 J * #	0.14 J *	0.028 J *	0.022 J *	0.022 J *	0.031 J *
Dibenzofuran	3.7	66	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.18 UJ	0.22 UJ
Fluoranthene	6.16	3980	0.064 J	0.081 J	1.8 J	0.34 J	0.034 J	0.019 UJ	0.019 UJ	0.039 J
Fluorene	3.9	70	0.019 UJ	0.024 J	0.19 J	0.056 J	0.019 UJ	0.019 UJ	0.019 UJ	0.022 U
Naphthalene	12	190	0.082	0.11	0.082	0.048 U	0.048 U	0.048 U	0.049 U	0.094
Phenanthrene			0.056 J	0.071 J	0.7 J	0.18 J	0.023 J	0.019 UJ	0.019 UJ	0.062

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

\# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD8 RAA-WCD8-B-051012 10/12/2005 Mid Depth	RAA-WCD8 RAA-WCD8-C-051012 10/12/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051012 10/12/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051012 10/12/2005 Outside Curtain	RAA-WCU4 RAA-WCU4-A-051012 10/12/2005 Surface Depth	RAA-WCU4 RAA-WCU4-B-051012 10/12/2005 Mid Depth	RAA-WCU4 RAA-WCU4-C-051012 10/12/2005 Bottom Depth	RAA-WCU7 RAA-WCU7-A-051012 10/12/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOC (µg/L)										
Anthracene	0.73	13	0.02 U	0.021	1.6 *	0.73	0.96 *	1.3 *	1.4 *	0.71
Benzo(a)anthracene	0.02	0.49	0.02 U	0.028 *	1.3 * #	0.86 * #	0.66 * #	0.77 * #	0.88 * #	0.55 * #
Benzo(a)pyrene	0.01	0.24	0.02 U	0.027 *	1 * #	0.87 * #	0.88 * #	1.1 * #	0.94 * #	0.64 * #
Dibenzofuran	3.7	66	0.2 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.22 UJ	0.2 UJ	0.2 UJ	0.23 UJ
Fluoranthene	6.16	3980	0.047 J	0.066 J	2.5 J	1.6 J	2.2 J	2.9 J	3.3 J	1.8 J
Fluorene	3.9	70	0.02 U	0.019 U	0.96	0.59	0.7	0.8	0.82	0.51
Naphthalene	12	190	0.12	0.098	12	8.2	11	8.3	9	7.8
Phenanthrene			0.073	0.086	4.7	2.6	3.8	4.2	4.8	3.2

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL.

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

\# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU7 RAA-WCU7-B-051012 10/12/2005 Mid Depth	RAA-WCU7 RAA-WCU7-C-051012 10/12/2005 Bottom Depth
Conventionals (µg/L)				
Cyanide	5.2	20	5.6 U	5.6 U
SVOC (µg/L)				
Anthracene	0.73	13	1 *	1.1 *
Benzo(a)anthracene	0.02	0.49	0.58 * #	0.56 * #
Benzo(a)pyrene	0.01	0.24	0.86 * #	0.74 * #
Dibenzofuran	3.7	66	0.2 UJ	0.19 UJ
Fluoranthene	6.16	3980	2.1 J	1.9 J
Fluorene	3.9	70	0.7	0.66
Naphthalene	12	190	10	9.5
Phenanthrene			3.7	2.9

Notes:

µg/l Micrograms per liter

U *Non-Detect*

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Z See Case Narrative.

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-A-051013 10/13/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051013 10/13/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051013 10/13/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051013 10/13/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051013 10/13/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051013 10/13/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051013 10/13/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051013 10/13/2005 Outside Curtain
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.8 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	–	–	–	–	–	–	1.9 *	0.2
Benzo(a)anthracene	0.02	0.49	–	–	–	–	–	–	1.1 * B	0.12 *
Benzo(a)pyrene	0.01	0.24	–	–	–	–	–	–	1.3 * B	0.2 *
Dibenzofuran	3.7	66	–	–	–	–	–	–	0.22	0.19 U
Fluoranthene	6.16	3980	–	–	–	–	–	–	5.7	0.56
Fluorene	3.9	70	–	–	–	–	–	–	1.4	0.23
Naphthalene	12	190	–	–	–	–	–	–	8.4	2
Phenanthrene	–	–	–	–	–	–	–	–	3.3	0.71

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Bold Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-051013 10/13/2005 Surface Depth	RAA-WCU RAA-WCU-B-051013 10/13/2005 Mid Depth	RAA-WCU RAA-WCU-C-051013 10/13/2005 Bottom Depth	RAA-WD1 RAA-WD1-A-051013 10/13/2005 Surface Depth	RAA-WD1 RAA-WD1-B-051013 10/13/2005 Mid Depth	RAA-WD1 RAA-WD1-C-051013 10/13/2005 Bottom Depth	RAA-WD9 RAA-WD9-A-051013 10/13/2005 Surface Depth	RAA-WD9 RAA-WD9-B-051013 10/13/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	–	–	–	–	–
SVOCs (µg/L)										
Anthracene	0.73	13	0.021 U	0.019 U	0.024 U	0.22	0.095	0.097	0.19	0.18
Benzo(a)anthracene	0.02	0.49	0.021 U	0.019 U	0.024 U	0.13 *	0.067 *	0.064 *	0.14 *	0.12 *
Benzo(a)pyrene	0.01	0.24	0.021 U	0.019 U	0.024 U	0.22 *	0.14 *	0.14 *	0.23 *	0.22 *
Dibenzofuran	3.7	66	0.21 U	0.19 U	0.24 U	0.22 U	0.2 U	0.19 U	0.19 U	0.2 U
Fluoranthene	6.16	3980	0.034	0.02	0.024 U	0.61	0.3	0.29	0.63	0.56
Fluorene	3.9	70	0.021 U	0.019 U	0.024 U	0.22	0.11	0.12	0.22	0.17
Naphthalene	12	190	0.052 U	0.048 U	0.059 U	2.1	1.1	1.1	2.1	1.4
Phenanthrene	–	–	0.024	0.019 U	0.024 U	0.76	0.4	0.41	0.8	0.66

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range *so that it can be reported*

** Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WD9 RAA-WD9-C-051013 10/13/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051014 10/14/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051014 10/14/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051014 10/14/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051014 10/14/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051014 10/14/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051014 10/14/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051014 10/14/2005 Inside Curtain
Conventionals (µg/L)										
Cyanide	5.2	20	–	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.019 U	0.32	0.19	0.17	0.055	0.2	0.083	0.46
Benzo(a)anthracene	0.02	0.49	0.019 U	0.21 *	0.12 *	0.11 *	0.049 *	0.11 *	0.062 *	0.39 *
Benzo(a)pyrene	0.01	0.24	0.019 U	0.32 * #	0.2 J *	0.21 *	0.13 *	0.21 *	0.14 *	0.49 * #
Dibenzofuran	3.7	66	0.19 U	0.2 U	0.19 U	0.2 U	0.24 U	0.2 U	0.2 U	0.19 U
Fluoranthene	6.16	3980	0.019 U	0.88	0.44	0.47	0.19	0.46	0.24	1.8
Fluorene	3.9	70	0.019 U	0.22	0.13	0.11	0.058	0.13	0.055	0.3
Naphthalene	12	190	0.048 U	0.96	1.7	1.4	0.43	1.6	0.61	0.098
Phenanthrene	–	–	0.019 U	0.73	0.49	0.52	0.16	0.52	0.19	0.41

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

*# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCOUT RAA-OUTSIDE-051014 10/14/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051014 10/14/2005 Surface Depth	RAA-WCU RAA-WCU-B-051014 10/14/2005 Mid Depth	RAA-WCU RAA-WCU-C-051014 10/14/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051015 10/15/2005 Surface Depth	RAA-WCD1 RAA-WCD1-A-051015-DUP 10/15/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051015 10/15/2005 Mid Depth
Conventionals (µg/L)									
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	6.8 J *	5.7 J *	7.2 J *
SVOCs (µg/L)									
Anthracene	0.73	13	**0.16**	0.019 U	0.02 U	**0.02**	**0.053**	**0.053**	**0.081**
Benzo(a)anthracene	0.02	0.49	**0.13 ***	0.019 U	0.02 U	**0.023 ***	**0.042 ***	**0.042 ***	**0.089 ***
Benzo(a)pyrene	0.01	0.24	**0.22 ***	0.019 UJ	0.02 U	**0.09 ***	**0.11 ***	**0.11 ***	**0.14 ***
Dibenzofuran	3.7	66	0.19 U	0.19 U	0.2 U	0.19 U	0.2 U	0.2 U	0.19 U
Fluoranthene	6.16	3980	**0.56**	0.019 U	0.02 U	**0.069**	**0.18**	**0.17**	**0.3**
Fluorene	3.9	70	**0.13**	0.019 U	0.02 U	0.019 U	**0.055**	**0.067**	**0.11**
Naphthalene	12	190	**0.53**	0.049 U	0.049 U	**0.18**	**0.54**	**0.65**	**1.2**
Phenanthrene	–	–	**0.29**	0.019 U	0.02 U	**0.065**	**0.14**	**0.15**	**0.3**

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

**# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-C-051015 10/15/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051015 10/15/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051015 10/15/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051015 10/15/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051015 10/15/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051015 10/15/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051015 10/15/2005 Surface Depth	RAA-WCU RAA-WCU-B-051015 10/15/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	6.5 J *	6.1 J *	7 J *	6.7 J *	6.4 J *	11 *	6 J *
SVOCs (µg/L)										
Anthracene	0.73	13	0.38	0.21	0.2	0.74 *	0.53	0.16	0.02 U	0.02 U
Benzo(a)anthracene	0.02	0.49	0.28 *	0.13 *	0.069 *	0.5 * #	0.3 *	0.11 *	0.02 U	0.02 U
Benzo(a)pyrene	0.01	0.24	0.38 * #	0.2 *	0.14 *	0.61 J * #	0.39 * #	0.2 *	0.02 U	0.02 U
Dibenzofuran	3.7	66	0.2 U	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.2 U	0.2 U
Fluoranthene	6.16	3980	1.1	0.51	0.27	2.2	1.3	0.48	0.02 U	0.02 U
Fluorene	3.9	70	0.35	0.22	0.11	0.6	0.38	0.18	0.02 U	0.02 U
Naphthalene	12	190	2.3	2.9	1.3	4.9	2.8	1.7	0.049 U	0.049 U
Phenanthrene	–	–	0.95	0.62	0.33	1.8	1	0.44	0.02 U	0.02 U

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-C-051015 10/15/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051016 10/16/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051016 10/16/2005 Mid Depth	RAA-WCD1 RAA-WCD1-B-051016-DUP 10/16/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051016 10/16/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051016 10/16/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051016 10/16/2005 Mid Depth
Conventionals (µg/L)									
Cyanide	5.2	20	6.5 J *	5.6 U	5.6 U	5.6 U	5.6 U	6.1 J *	5.6 U
SVOCs (µg/L)									
Anthracene	0.73	13	0.02 U	0.15	0.32	0.25	0.56	0.12	0.25
Benzo(a)anthracene	0.02	0.49	0.02 U	0.068 *	0.2 *	0.17 *	0.41 *	0.072 *	0.19 *
Benzo(a)pyrene	0.01	0.24	0.02 U	0.079 *	0.23 *	0.21 *	0.47 *,#	0.09 *	0.21 *
Dibenzofuran	3.7	66	0.2 U	0.19 U	0.19 U	0.24 U	0.2 U	0.19 U	0.19 U
Fluoranthene	6.16	3980	0.031	0.31	0.74	0.65	1.4	0.31	0.66
Fluorene	3.9	70	0.02 U	0.16	0.28	0.23	0.42	0.13	0.2
Naphthalene	12	190	0.05 U	2.2	3.9	2.8	6.8	1.6	2.3
Phenanthrene	--	--	0.02 U	0.44	0.72	0.58	1.3	0.35	0.62

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

*# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD9 RAA-WCD9-C-051016 10/16/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051016 10/16/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051016 10/16/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051016 10/16/2005 Surface Depth	RAA-WCU RAA-WCU-B-051016 10/16/2005 Mid Depth	RAA-WCU RAA-WCU-C-051016 10/16/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051017 10/17/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051017 10/17/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	6 J *	6.2 J *	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.52	0.12	0.13	0.019 U	0.02 U	0.02 U	0.041	0.51
Benzo(a)anthracene	0.02	0.49	0.39 *	0.082 *	0.1 *	0.02	0.02 U	0.02	0.035 J *	0.32 J *
Benzo(a)pyrene	0.01	0.24	0.43 *#	0.1 *	0.13 *	0.043 *	0.033 *	0.038 *	0.046 *	0.29 *#
Dibenzofuran	3.7	66	0.19 U	0.19 U	0.32 U	0.19 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ
Fluoranthene	6.16	3980	1.4	0.29	0.43	0.04	0.039	0.045	0.15	1.1
Fluorene	3.9	70	0.41	0.11	0.13	0.019 U	0.02 U	0.02 U	0.035	0.29
Naphthalene	12	190	6.9	1.4	0.81	0.049 U	0.049 U	0.049 U	0.32 J	1.7 J
Phenanthrene	–	–	1.1	0.37	0.17	0.028	0.027	0.035	0.12	0.99

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

*# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-B-051017-DUP 10/17/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051017 10/17/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051017 10/17/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051017 10/17/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051017 10/17/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051017 10/17/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051017 10/17/2005 Outside Curtain
Conventionals (µg/L)									
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	6.3 J °	5.6 U
SVOCs (µg/L)									
Anthracene	0.73	13	0.53	0.94 °	0.13	0.27	0.47	0.25	0.59
Benzo(a)anthracene	0.02	0.49	0.42 J °	0.56 J ° #	0.074 J °	0.18 J °	0.51 J ° #	0.2 J °	0.4 J °
Benzo(a)pyrene	0.01	0.24	0.31 ° #	0.46 ° #	0.02 U	0.19 °	0.45 ° #	0.13 °	0.33 ° #
Dibenzofuran	3.7	66	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.19 UJ	0.2 UJ
Fluoranthene	6.16	3980	1.4	1.9	0.31	0.66	1.3	0.51	1.6
Fluorene	3.9	70	0.27	0.4	0.097	0.16	0.2	0.13	0.36
Naphthalene	12	190	1.6 J	3.6 J	0.92 J	1.5 J	1.5 J	1.6 J	2.2 J
Phenanthrene	–	–	1.1	1.6	0.39	0.71	0.87	0.84	1.4

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J *Estimated, the result is below the reporting limit and above the lab MDL*

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

° Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-051017 10/17/2005 Surface Depth	RAA-WCU RAA-WCU-B-051017 10/17/2005 Mid Depth	RAA-WCU RAA-WCU-C-051017 10/17/2005 Bottom Depth	RAA-WCD2 RAA-WCD2-A-051018 10/18/2005 Surface Depth	RAA-WCD2 RAA-WCD2-B-051018 10/18/2005 Mid Depth	RAA-WCD2 RAA-WCD2-C-051018 10/18/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051018 10/18/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051018 10/18/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	6.1 J *	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.02 U	0.02 U	0.019 U	0.77 *	0.94 *	1.4 *	0.39	0.35
Benzo(a)anthracene	0.02	0.49	0.02 UJ	0.02 UJ	0.019 UJ	0.67 * #	0.74 * #	1.1 * #	0.33 *	0.22 *
Benzo(a)pyrene	0.01	0.24	0.02 U	0.02 U	0.019 U	0.79 * #	0.92 * #	1.3 * #	0.47 * #	0.33 * #
Dibenzofuran	3.7	66	0.2 UJ	0.2 UJ	0.19 UJ	0.2 U	0.19 U	0.2 U	0.2 U	0.18 U
Fluoranthene	6.16	3980	0.034	0.026	0.019 U	2.6	2.9	4.2	1.1	0.86
Fluorene	3.9	70	0.02 U	0.02 U	0.019 U	0.43	0.39	0.57	0.29	0.23
Naphthalene	12	190	0.43 J	0.049 UJ	0.049 UJ	0.56	0.53	0.63	2.2	1.8
Phenanthrene	–	–	0.039	0.023	0.019 U	1.2	1.3	2	1	0.75

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID / Sample ID / Sample Date / Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD9 RAA-WCD9-C-051018 10/18/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051018 10/18/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051018 10/18/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051018 10/18/2005 Surface Depth	RAA-WCU RAA-WCU-B-051018 10/18/2005 Mid Depth	RAA-WCU RAA-WCU-C-051018 10/18/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051020 10/20/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051020 10/20/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.56	0.97 *	0.063	0.019 U	0.037	0.028	0.31 J	0.24 J
Benzo(a)anthracene	0.02	0.49	0.44 *	0.71 * #	0.058 *	0.023 *	0.027 *	0.021 *	0.2 J *	0.32 J *
Benzo(a)pyrene	0.01	0.24	0.54 * #	0.81 * #	0.14 *	0.099 *	0.1 *	0.096 *	0.52 J * #	0.41 J * #
Dibenzofuran	3.7	66	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U	0.2 U	0.19 UJ	0.19 UJ
Fluoranthene	6.16	3980	1.6	2.7	0.26	0.075	0.094	0.076	0.67 J	0.58 J
Fluorene	3.9	70	0.37	0.41	0.059	0.019 U	0.02 U	0.02 U	0.15 J	0.063 J
Naphthalene	12	190	2.7	0.71	0.45	0.049 U	0.056	0.078	2.1 J	0.38 J
Phenanthrene	–	–	1.3	1.1	0.19	0.047	0.054	0.05	0.94 J	0.55 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-C-051020 10/20/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051020 10/20/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051020 10/20/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051020 10/20/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051020 10/20/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051020 10/20/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051020 10/20/2005 Surface Depth
Conventionals (µg/L)									
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 J *
SVOCs (µg/L)									
Anthracene	0.73	13	0.63 J	0.048 J	0.13 J	0.35 J	0.48 J	0.082 J	0.019 UJ
Benzo(a)anthracene	0.02	0.49	0.4 J *	0.032 J *	0.11 J *	0.28 J *	0.29 J *	0.059 J *	0.019 UJ
Benzo(a)pyrene	0.01	0.24	0.42 J * #	0.034 J *	0.26 J * #	0.32 J * #	0.31 J * #	0.081 J *	0.019 UJ
Dibenzofuran	3.7	66	0.19 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.19 UJ
Fluoranthene	6.16	3980	1.3 J	0.13 J	0.39 J	0.9 J	1.1 J	0.25 J	0.019 UJ
Fluorene	3.9	70	0.27 J	0.043 J	0.13 J	0.2 J	0.24 J	0.084 J	0.019 UJ
Naphthalene	12	190	2.1 J	0.56 J	1.1 J	2.6 J	2.5 J	0.61 J	0.048 UJ
Phenanthrene	–	–	1.4 J	0.21 J	0.58 J	1 J	1.5 J	0.27 J	0.019 UJ

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

"#" Exceedence of Acute Criteria

"*" Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-051020-RINS 10/20/2005 Rinsate Blank	RAA-WCU RAA-WCU-B-051020 10/20/2005 Mid Depth	RAA-WCU RAA-WCU-C-051020 10/20/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051021 10/21/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051021 10/21/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051021 10/21/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051021 10/21/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051021 10/21/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.02 UJ	0.019 UJ	0.019 UJ	**0.21 J**	**0.47 J**	**0.39 J**	**0.11 J**	**0.23 J**
Benzo(a)anthracene	0.02	0.49	0.02 UJ	0.019 UJ	0.019 UJ	**0.14 J •**	0.019 UJ	**0.24 J •**	**0.069 J •**	**0.15 J •**
Benzo(a)pyrene	0.01	0.24	0.02 UJ	0.019 UJ	**0.021 J •**	**0.17 J •**	**0.33 J • #**	**0.3 J • #**	**0.089 J •**	**0.18 J •**
Dibenzofuran	3.7	66	0.2 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.19 UJ
Fluoranthene	6.16	3980	0.02 UJ	0.019 UJ	0.019 UJ	**0.56 J**	**0.97 J**	**0.88 J**	**0.28 J**	**0.58 J**
Fluorene	3.9	70	0.02 UJ	0.019 UJ	0.019 UJ	**0.17 J**	**0.25 J**	**0.24 J**	**0.1 J**	**0.19 J**
Naphthalene	12	190	**0.15 J**	0.048 UJ	0.048 UJ	**1.8 J**	**2.3 J**	**2 J**	**1.2 J**	**2.1 J**
Phenanthrene	–	–	0.02 UJ	0.019 UJ	0.019 UJ	**0.68 J**	**1 J**	**0.94 J**	**0.35 J**	**0.71 J**

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

• Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD9 RAA-WCD9-B-051021-DUP 10/21/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051021 10/21/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051021 10/21/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051021 10/21/2005 Outside Curtain	RAA-WCU RAA-WCU-A-051021 10/21/2005 Surface Depth	RAA-WCU RAA-WCU-B-051021 10/21/2005 Mid Depth	RAA-WCU RAA-WCU-C-051021 10/21/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-051022 10/22/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	**5.7 J***	5.6 U	5.6 U	5.6 U	5.6 U	**5.7 J***	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	**0.22 J**	**0.28 J**	**0.28 J**	**0.4 J**	0.021 UJ	0.02 UJ	0.019 UJ	0.02 UJ
Benzo(a)anthracene	0.02	0.49	**0.15 J***	**0.15 J***	**0.18 J***	**0.28 J***	0.021 UJ	**0.024 J***	0.019 UJ	0.02 UJ
Benzo(a)pyrene	0.01	0.24	**0.18 J***	**0.19 J***	**0.24 J***	**0.35 J*#**	**0.023 J***	**0.033 J***	**0.028 J***	0.02 UJ
Dibenzofuran	3.7	68	0.19 UJ	0.2 UJ	0.19 UJ	0.19 UJ	0.21 UJ	0.2 UJ	0.19 UJ	0.2 UJ
Fluoranthene	6.16	3980	**0.58 J**	**0.59 J**	**0.72 J**	**1 J**	0.021 UJ	**0.039 J**	**0.024 J**	**0.034 J**
Fluorene	3.9	70	**0.18 J**	**0.19 J**	**0.19 J**	**0.24 J**	0.021 UJ	0.02 UJ	0.019 UJ	0.02 UJ
Naphthalene	12	190	**2 J**	**1.7 J**	**1.5 J**	**1.7 J**	0.053 UJ	0.05 UJ	0.048 UJ	**0.2 J**
Phenanthrene	–	–	**0.67 J**	**0.69 J**	**0.78 J**	**1.1 J**	0.021 UJ	0.02 UJ	0.019 UJ	**0.057 J**

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

\# Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD8 RAA-WCD8-B-051022 10/22/2005 Mid Depth	RAA-WCD8 RAA-WCD8-C-051022 10/22/2005 Bottom Depth	RAA-WCIN RAA-INSIDE-051022 10/22/2005 Inside Curtain	RAA-WCOUT RAA-OUTSIDE-051022 10/22/2005 Outside Curtain	RAA-WCU4 RAA-WCU4-A-051022 10/22/2005 Surface Depth	RAA-WCU4 RAA-WCU4-B-051022 10/22/2005 Mid Depth	RAA-WCU4 RAA-WCU4-C-051022 10/22/2005 Bottom Depth	RAA-WCU7 RAA-WCU7-A-051022 10/22/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.021 UJ	0.019 UJ	0.37 J	0.26 J	0.019 UJ	0.02 J	0.019 UJ	0.019 UJ
Benzo(a)anthracene	0.02	0.49	0.021 UJ	0.019 UJ	0.27 J *	0.22 J *	0.019 UJ	0.02 UJ	0.019 UJ	0.019 UJ
Benzo(a)pyrene	0.01	0.24	0.021 UJ	0.032 J *	0.34 J * #	0.25 J * #	0.019 UJ	0.02 UJ	0.039 J *	0.02 J *
Dibenzofuran	3.7	66	0.21 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.19 UJ	0.2 UJ	0.19 UJ	0.19 UJ
Fluoranthene	6.16	3980	0.034 J	0.052 J	1 J	0.83 J	0.044 J	0.049 J	0.046 J	0.019 UJ
Fluorene	3.9	70	0.021 UJ	0.019 UJ	0.35 J	0.31 J	0.019 UJ	0.02 UJ	0.019 UJ	0.019 UJ
Naphthalene	12	190	0.077 J	0.061 J	3.3 J	2.8 J	0.18 J	0.12 J	0.11 J	0.047 UJ
Phenanthrene	–	–	0.037 J	0.043 J	1.5 J	1 J	0.063 J	0.061 J	0.058 J	0.019 UJ

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU7 RAA-WCU7-B-051022 10/22/2005 Mid Depth	RAA-WCU7 RAA-WCU7-C-051022 10/22/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051023 10/23/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051023 10/23/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051023 10/23/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-DUP-051023 10/23/2005 Duplicate Sample	RAA-WCD4 RAA-WCD4-A-051023 10/23/2005 Surface Depth
Conventionals (µg/L)									
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)									
Anthracene	0.73	13	0.02 UJ	0.02 UJ	0.13 J	0.16 J	0.14 J	0.13 J	0.054 J
Benzo(a)anthracene	0.02	0.49	0.02 UJ	0.02 UJ	0.095 J *	0.14 J *	0.12 J *	0.12 J *	0.04 J *
Benzo(a)pyrene	0.01	0.24	0.027 J *	0.027 J *	0.12 J *	0.27 J * #	0.17 J *	0.16 J *	0.05 J *
Dibenzofuran	3.7	66	0.2 UJ	0.2 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Fluoranthene	6.16	3980	0.031 J	0.032 J	0.39 J	0.63 J	0.45 J	0.47 J	0.18 J
Fluorene	3.9	70	0.02 UJ	0.02 UJ	0.11 J	0.15 J	0.12 J	0.12 J	0.053 J
Naphthalene	12	190	0.049 UJ	0.049 UJ	1.2 J	1.1 J	0.98 J	0.84 J	0.58 J
Phenanthrene	–	–	0.03 J	0.024 J	0.45 J	0.8 J	0.49 J	0.52 J	0.22 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID / Sample ID / Sample Date / Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD4 RAA-WCD4-B-051023 10/23/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-051023 10/23/2005 Bottom Depth	RAA-WCU RAA-WCU-A-051023 10/23/2005 Surface Depth	RAA-WCU RAA-WCU-B-051023 10/23/2005 Mid Depth	RAA-WCU RAA-WCU-C-051023 10/23/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-051024 10/24/2005 Surface Depth	RAA-WCD8 RAA-WCD8-B-051024 10/24/2005 Mid Depth	RAA-WCD8 RAA-WCD8-C-051024 10/24/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.11 J	0.19 J	0.019 UJ	0.026 J	0.02 J	0.019 UJ	0.098 J	0.38 J
Benzo(a)anthracene	0.02	0.49	0.098 J *	0.16 J *	0.019 UJ	0.021 J *	0.02 J	0.019 UJ	0.065 J *	0.25 J *
Benzo(a)pyrene	0.01	0.24	0.13 J *	0.19 J *	0.021 J *	0.02 UJ	0.023 J *	0.019 UJ	0.079 J *	0.32 J * #
Dibenzofuran	3.7	66	0.21 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.2 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Fluoranthene	6.16	3980	0.36 J	0.55 J	0.061 J	0.054 J	0.048 J	0.041 J	0.25 J	0.9 J
Fluorene	3.9	70	0.11 J	0.12 J	0.019 UJ	0.02 UJ	0.02 UJ	0.019 UJ	0.055 J	0.18 J
Naphthalene	12	190	0.86 J	0.76 J	0.13 J	0.082 J	0.052 J	0.071 J	0.31 J	1 J
Phenanthrene	–	–	0.42 J	0.5 J	0.069 J	0.067 J	0.059 J	0.049 J	0.28 J	1 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU4 RAA-WCU4-A-051024 10/24/2005 Surface Depth	RAA-WCU4 RAA-WCU4-B-051024 10/24/2005 Mid Depth	RAA-WCU4 RAA-WCU4-C-051024 10/24/2005 Bottom Depth	RAA-WCU7 RAA-WCU7-A-051024 10/24/2005 Surface Depth	RAA-WCU7 RAA-WCU7-B-051024 10/24/2005 Mid Depth	RAA-WCU7 RAA-WCU7-C-051024 10/24/2005 Bottom Depth	RAA-WCD8 RAA-WCD8-A-051025 10/25/2005 Surface Depth	RAA-WCD8 RAA-WCD8-B-051025 10/25/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.12 J	0.17 J	0.16 J	0.023 J	0.12 J	0.16 J	0.031 J	0.046 J
Benzo(a)anthracene	0.02	0.49	0.089 J *	0.12 J *	0.1 J *	0.019 UJ	0.073 J *	0.11 J *	0.027 J *	0.039 J *
Benzo(a)pyrene	0.01	0.24	0.1 J *	0.13 J *	0.13 J *	0.02 J *	0.093 J *	0.14 J *	0.043 J *	0.062 J *
Dibenzofuran	3.7	66	0.19 UJ	0.22 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ
Fluoranthene	6.16	3980	0.52 J	0.56 J	0.45 J	0.088 J	0.34 J	0.5 J	0.11 J	0.15 J
Fluorene	3.9	70	0.18 J	0.22 J	0.14 J	0.046 J	0.11 J	0.16 J	0.041 J	0.048 J
Naphthalene	12	190	1.5 J	2.1 J	1.5 J	0.39 J	1.1 J	1.6 J	0.41 J	0.45 J
Phenanthrene	–	–	0.82 J	0.89 J	0.85 J	0.17 J	0.62 J	0.74 J	0.15 J	0.2 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD8 RAA-WCD8-C-051025 10/25/2005 Bottom Depth	RAA-WCU4 RAA-WCU4-A-051025 10/25/2005 Surface Depth	RAA-WCU4 RAA-WCU4-B-051025 10/25/2005 Mid Depth	RAA-WCU4 RAA-WCU4-C-051025 10/25/2005 Bottom Depth	RAA-WCU7 RAA-WCU7-A-051025 10/25/2005 Surface Depth	RAA-WCU7 RAA-WCU7-B-051025 10/25/2005 Mid Depth	RAA-WCU7 RAA-WCU7-C-051025 10/25/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051026 10/26/2005 Surface Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	5.6 U	16.8 J.*
SVOCs (µg/L)										
Anthracene	0.73	13	0.093 J	0.19 J	0.21 J	0.019 UJ	0.042 J	0.18 J	0.14 J	0.036 J
Benzo(a)anthracene	0.02	0.49	0.085 J *	0.13 J *	0.15 J *	0.019 UJ	0.052 J *	0.12 J *	0.099 J *	0.034 J *
Benzo(a)pyrene	0.01	0.24	0.1 J *	0.19 J *	0.19 J *	0.019 UJ	0.044 J *	0.15 J *	0.11 J *	0.047 J *
Dibenzofuran	3.7	66	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.2 UJ
Fluoranthene	6.16	3980	0.21 J	0.59 J	0.54 J	0.019 UJ	0.17 J	0.5 J	0.38 J	0.12 J
Fluorene	3.9	70	0.061 J	0.17 J	0.15 J	0.019 UJ	0.047 J	0.15 J	0.11 J	0.038 J
Naphthalene	12	190	0.55 J	2 J	2 J	0.048 UJ	0.93 J	1.8 J	1.6 J	0.47 J
Phenanthrene	–	–	0.26 J	0.87 J	0.78 J	0.019 UJ	0.21 J	0.63 J	0.49 J	0.26 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

* Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD1 RAA-WCD1-B-051026 10/26/2005 Mid Depth	RAA-WCD1 RAA-WCD1-B-051026-DUP 10/26/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051026 10/26/2005 Bottom Depth	RAA-WCD4 RAA-WCD4-A-051026 10/26/2005 Surface Depth	RAA-WCD4 RAA-WCD4-B-051026 10/26/2005 Mid Depth	RAA-WCD4 RAA-WCD4-C-051026 10/26/2005 Bottom Depth	RAA-WCU RAA-WCU-A-051026 10/26/2005 Surface Depth
Conventionals (µg/L)									
Cyanide	5.2	20	6.8 J *	5 U	5 U	5 U	5 U	5 U	5.6 U
SVOCs (µg/L)									
Anthracene	0.73	13	0.082 J	0.057 J	0.043 J	0.085 J	0.019 UJ	0.058 J	–
Benzo(a)anthracene	*0.02*	*0.49*	*0.052 J **	*0.043 J **	*0.043 J **	*0.067 J **	*0.019 UJ*	*0.056 J **	–
Benzo(a)pyrene	0.01	0.24	0.07 J *	0.052 J *	0.062 J *	0.13 J *	0.019 UJ	0.067 J *	–
Dibenzofuran	3.7	66	0.2 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.19 UJ	0.19 UJ	–
Fluoranthene	6.16	3980	0.24 J	0.15 J	0.15 J	0.27 J	0.019 UJ	0.23 J	–
Fluorene	3.9	70	0.08 J	0.043 J	0.041 J	0.088 J	0.019 UJ	0.077 J	–
Naphthalene	12	190	0.98 J	0.67 J	0.53 J	1.3 J	0.047 UJ	1 J	–
Phenanthrene	–	–	0.43 J	0.25 J	0.18 J	0.44 J	0.019 UJ	0.41 J	–

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-B-051026 10/26/2005 Mid Depth	RAA-WCU RAA-WCU-C-051026 10/26/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051027 10/27/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051027 10/27/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051027 10/27/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051027 10/27/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051027 10/27/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051027 10/27/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5.6 U	5.9 J *	5 U	5 U	5 U	5 U	5 U	5 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.02 UJ	0.019 UJ
Benzo(a)anthracene	0.02	0.49	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.02 UJ	0.019 UJ
Benzo(a)pyrene	0.01	0.24	0.019 UJ	0.022 J *	0.019 UJ	0.027 J *	0.029 J *	0.019 UJ	0.02 UJ	0.019 UJ
Dibenzofuran	3.7	66	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.19 UJ
Fluoranthene	6.16	3980	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.028 J	0.019 UJ	0.02 UJ	0.019 UJ
Fluorene	3.9	70	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	0.02 UJ	0.019 UJ
Naphthalene	12	190	0.047 UJ	0.048 UJ	0.048 UJ	0.048 UJ	0.07 J	0.049 J	0.068 J	0.084 J
Phenanthrene	--	--	0.019 UJ	0.019 UJ	0.019 UJ	0.028 J	0.035 J	0.021 J	0.021 J	0.03 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCU RAA-WCU-A-051027 10/27/2005 Surface Depth	RAA-WCU RAA-WCU-B-051027 10/27/2005 Mid Depth	RAA-WCU RAA-WCU-C-051027 10/27/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051028 10/28/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051028 10/28/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051028 10/28/2005 Bottom Depth	RAA-WCD9 RAA-WCD9-A-051028 10/28/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051028 10/28/2005 Mid Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
SVOCs (µg/L)										
Anthracene	0.73	13	0.019 UJ	0.02 UJ	0.019 UJ	0.019 UJ	0.019 U	0.022 U	0.021 U	0.02 UJ
Benzo(a)anthracene	0.02	0.49	0.019 UJ	0.02 UJ	0.019 UJ	0.019 UJ	0.019 U	0.023 *	0.021 U	0.02 UJ
Benzo(a)pyrene	0.01	0.24	0.019 UJ	0.02 UJ	0.025 J *	0.019 UJ	0.019 UJ	0.022 J *	0.021 UJ	0.02 UJ
Dibenzofuran	3.7	66	0.19 UJ	0.2 UJ	0.19 UJ	0.19 UJ	0.19 U	0.22 U	0.21 U	0.2 UJ
Fluoranthene	6.16	3980	0.019 UJ	0.02 UJ	0.019 UJ	0.058 J	0.019 U	0.072	0.021 U	0.044 J
Fluorene	3.9	70	0.019 UJ	0.02 U	0.019 UJ	0.021 J	0.019 UJ	0.022 J	0.021 UJ	0.02 UJ
Naphthalene	12	190	0.048 UJ	0.05 UJ	0.048 UJ	0.094 J	0.048 U	0.11	0.053 U	0.088 J
Phenanthrene	–	–	0.019 UJ	0.02 UJ	0.019 UJ	0.08 J	0.019 U	0.083	0.021 U	0.057 J

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

* Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD9 RAA-WCD9-C-051028 10/28/2005 Bottom Depth	RAA-WCU RAA-WCU-A-051028 10/28/2005 Surface Depth	RAA-WCU RAA-WCU-B-051028 10/28/2005 Mid Depth	RAA-WCU RAA-WCU-C-051028 10/28/2005 Bottom Depth	RAA-WCU RAA-WCU-C-051028-DUP 10/28/2005 Bottom Depth	RAA-WCD1 RAA-WCD1-A-051029 10/29/2005 Surface Depth	RAA-WCD1 RAA-WCD1-B-051029 10/29/2005 Mid Depth	RAA-WCD1 RAA-WCD1-C-051029 10/29/2005 Bottom Depth
Conventionals (µg/L)										
Cyanide	5.2	20	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
SVOCs (µg/L)										
Anthracene	0.73	13	**0.042**	0.019 U	0.019 U	0.019 U	0.019 U	**0.073**	0.019 U	**0.037**
Benzo(a)anthracene	0.02	0.49	**0.041 ***	0.019 U	0.019 U	0.019 U	0.019 U	**0.086 ***	0.019 U	**0.035 ***
Benzo(a)pyrene	0.01	0.24	**0.043 J ***	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	**0.11 ***	0.019 U	**0.038 ***
Dibenzofuran	3.7	66	0.2 U	0.19 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.19 U
Fluoranthene	6.16	3980	**0.13**	0.019 U	0.019 U	0.019 U	**0.037**	**0.3**	**0.063**	**0.11**
Fluorene	3.9	70	**0.033 J**	0.019 UJ	0.019 UJ	0.019 UJ	0.019 UJ	**0.07**	0.019 U	**0.034**
Naphthalene	12	190	**0.17**	0.048 U	0.048 U	0.048 U	0.047 U	**0.42**	**0.091**	**0.19**
Phenanthrene	–	–	**0.12**	0.019 U	0.019 U	0.019 U	**0.046**	**0.32**	**0.079**	**0.14**

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

** Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 17
Water Quality Monitoring Results Compared to Triggers—Laboratory Parameters

Location ID Sample ID Sample Date Chemical Name	Chronic Criteria	Acute Criteria	RAA-WCD9 RAA-WCD9-A-051029 10/29/2005 Surface Depth	RAA-WCD9 RAA-WCD9-B-051029 10/29/2005 Mid Depth	RAA-WCD9 RAA-WCD9-C-051029 10/29/2005 Bottom Depth	RAA-WCU RAA-WCU-A-051029 10/29/2005 Surface Depth	RAA-WCU RAA-WCU-B-051029 10/29/2005 Mid Depth	RAA-WCU RAA-WCU-C-051029 10/29/2005 Bottom Depth
Conventionals (µg/L)								
Cyanide	5.2	20	5 U	5 U	5 U	5.6 U	5 U	5 U
SVOCs (µg/L)								
Anthracene	0.73	13	0.062	0.019 U	0.019 U	0.02 U	0.091	0.019 U
Benzo(a)anthracene	0.02	0.49	0.068 *	0.019 U	0.019 U	0.02 U	0.095 *	0.019 U
Benzo(a)pyrene	0.01	0.24	0.076 *	0.019 U	0.019 U	0.02 U	0.11 *	0.019 U
Dibenzofuran	3.7	66	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U	0.19 U
Fluoranthene	6.16	3980	0.23	0.019	0.019 U	0.02 U	0.37	0.019 U
Fluorene	3.9	70	0.052	0.019 U	0.019 U	0.02 U	0.096	0.019 U
Naphthalene	12	190	0.28	0.047 U	0.048 U	0.051 U	0.53	0.048 U
Phenanthrene	–	–	0.22	0.022	0.019 U	0.02 U	0.42	0.019 U

Notes:

µg/l Micrograms per liter

U Non-Detect

B Analyte was detected in the blank

J Estimated, the result is below the reporting limit and above the lab MDL

E Over range, the analyte was detected above the linear range of the curve and is estimated, the sample requires dilution to bring the analyte back into the linear range so that it can be reported

* Exceedence of Acute Criteria

* Exceedence of Chronic Criteria

Table 18
Background Water Quality Survey Results–Transfer Facility
August 17 and 18, 2005

Station ID	Date	Time	Latitude (dd)	Longitude (dd)	Depth (ft)	DO (mg/L)	Temp deg C	Turbidity (NTU)	pH
TF-WBGU	8/17/2005	1045	45.85347	119.67043	1	9.30	21.03	3.74	7.78
TF-WBGU	8/17/2005	1045	45.85347	119.67043	8	9.29	21.05	3.66	7.93
TF-WBGU	8/17/2005	1045	45.85347	119.67043	15	9.26	21.04	3.66	7.97
TF-WBGU	8/17/2005	1135	45.85347	119.67043	1	9.20	21.07	3.22	7.99
TF-WBGU	8/17/2005	1135	45.85347	119.67043	8	9.22	21.06	3.50	8.00
TF-WBGU	8/17/2005	1135	45.85347	119.67043	14	9.17	21.05	4.41	8.02
TF-WBGU	8/17/2005	1230	45.85347	119.67043	1	9.40	21.14	3.58	7.99
TF-WBGU	8/17/2005	1230	45.85347	119.67043	7	9.39	21.08	3.24	8.07
TF-WBGU	8/17/2005	1230	45.85347	119.67043	14	9.39	21.07	3.48	8.09
TF-WBGU	8/17/2005	1425	45.85347	119.67043	1	9.41	21.63	2.95	8.01
TF-WBGU	8/17/2005	1425	45.85347	119.67043	9	9.40	21.24	2.91	8.08
TF-WBGU	8/17/2005	1425	45.85347	119.67043	18	9.33	21.14	2.57	8.09
TF-WBGU	8/17/2005	1435	45.85347	119.67043	1	9.45	21.56	3.14	8.05
TF-WBGU	8/17/2005	1435	45.85347	119.67043	8	9.44	21.19	3.52	8.11
TF-WBGU	8/17/2005	1435	45.85347	119.67043	16	9.35	21.10	3.30	8.09
TF-WBGU	8/17/2005	1530	45.85347	119.67043	1	9.33	21.72	3.00	8.02
TF-WBGU	8/17/2005	1530	45.85347	119.67043	8	9.36	21.18	4.14	8.07
TF-WBGU	8/17/2005	1530	45.85347	119.67043	15	9.29	21.03	3.45	8.02
TF-WBGU	8/18/2005	900	45.85347	119.67043	1	9.19	21.16	2.65	7.95
TF-WBGU	8/18/2005	900	45.85347	119.67043	8	8.99	20.98	2.67	7.99
TF-WBGU	8/18/2005	900	45.85347	119.67043	15	8.97	20.96	3.11	8.00
TF-WBGU	8/18/2005	945	45.85347	119.67043	1	9.23	21.24	2.70	7.97
TF-WBGU	8/18/2005	945	45.85347	119.67043	8	9.20	21.05	2.93	8.00
TF-WBGU	8/18/2005	945	45.85347	119.67043	15	9.14	21.03	2.75	8.04
TF-WBGU	8/18/2005	1000	45.85347	119.67043	1	9.33	21.24	2.22	7.97
TF-WBGU	8/18/2005	1000	45.85347	119.67043	6	9.31	21.22	2.90	8.02
TF-WBGU	8/18/2005	1000	45.85347	119.67043	11	9.22	21.22	2.68	8.05

Table 28
Pre- and Post-Construction Sediment Trap Monitoring Collection Information

Station ID	Sample ID	Collection Date	Collection Duration (days)	Latitude[a] (Degrees N NAVD 83)	Longitude[a] (Degrees W NAVD 83)	Depth of Accumulated Sediment (cm)	Mass of Accumulation Rate (g/cm²/d)	Monitoring Observations
RAA-ST-1	RAA-STBU	08/17/2005	35	122.7542911	45.57889639	6.3	0.0446	Brown/grey silt, abundant zooplankton in overlying water, sediment surface flat/undisturbed, spotty sheen upon mixing, no odor
	RAA-STPU	11/08/2005	82	122.7542911	45.57889639	1.5	0.0036	Light brown silt, sediment surface flat/undisturbed, no sheen/odor
RAA-ST-2	RAA-STBM	08/18/2005	35	122.7588663	45.58056284	4.3	0.0295	Brown/grey silt, sediment surface flat/undisturbed, spotty sheen upon mixing, no odor
	RAA-STPM	11/08/2005	82	122.7588663	45.58056284	3.5	0.0183	Light brown silt, live crawdad in container, sediment surface disturbed upon removal of crawdad, no sheen/odor
RAA-ST-3	RAA-STBD	08/17/2005	35	122.7610736	45.58152637	1.0	0.0054	Brown silt, sediment surface flat/undisturbed, spotty sheen upon mixing, no odor
	RAA-STPD	11/08/2005	82	122.7610736	45.58152637	2.5	0.0155	Light brown silt, live crawdad in container, sediment surface disturbed upon removal of crawdad, no sheen/odor

Notes:
[a] - Monitoring stations are approximate based on diver estimations.
[b] – Mass approximated based on percent solids and assumed specific gravity (2.65)

Table 29
Pre- and Post-Construction Sediment Trap Analytical Results

Location ID	RAA-STBU	RAA-STBM	RAA-STBD	RAA-STPU	RAA-STPM	RAA-STPD
Sample ID	RAA-STBU-050817	RAA-STBM-050818	RAA-STBD-050817	RAA-STPU-051108	RAA-STPM-051108	RAA-STPD-051108
Sample Date	8/17/2005	8/18/2005	8/17/2005	11/8/2005	11/8/2005	11/8/2005
Description	Baseline Upstream	Baseline Removal Area	Baseline Downstream	Post-Construction Upstream	Post-Construction Removal Area	Post-Construction Downstream
Conventionals						
Total Solids (%)	16.5	16.0	12.6	13.1	28.6	33.8
Cyanide (mg/kg)	1.00 U	2.50	19.8	1.3	6.7	32.7
Total Organic Carbon (%)	3.43 J	3.59 J	3.60 J	3.5	5.99	5.84
Grain Size (%)						
Gravel	0.00	--	--	0.14	0.07	1.23
Sand, Coarse	0.50	--	--	0.63	0.53	2.28
Sand, Fine	1.48	--	--	2.78	8.95	13.7
Sand, Medium	0.45	--	--	0.68	1.83	5.13
Sand, Very Coarse	0.29	--	--	0.58	0.36	1.69
Sand, Very Fine	2.00	--	--	8.90	12.5	15.9
Silt	80.6	--	--	76.0	69.9	53.8
Clay	16.2	--	--	3.12	0.55	2.93
SVOCs (µg/kg)						
2-Methylnaphthalene	17.0	220	130	620	4700	2600
Acenaphthene	30.0	490	270	1300	16000	7400
Acenaphthylene	26.0	440	150	1100	5000	2900
Anthracene	75.0	1100	690	3500	38000	14000
Benzo(a)anthracene	170	3700	1400	7300	43000	39000
Benzo(a)pyrene	270	6100	2200	12000	60000	53000
Benzo(b)fluoranthene	200	4200	1400	7200	38000	33000
Benzo(g,h,i)perylene	260	5300	1900	9200	40000	37000
Benzo(k)fluoranthene	150	3000	1100	6400	30000	30000
Chrysene	250	4600	1900	8600	55000	48000
Dibenzo(a,h)anthracene	31.0	650	250	880	3900	4200
Dibenzofuran	6.70 J	62.0	28.0	97 J	1200	630
Fluoranthene	320	6400	2400	18000	140000	78000
Fluorene	21.0	310	180	710	10000	4200
Indeno(1,2,3-cd)pyrene	210	4900	1600	8100	39000	35000
Naphthalene	50.0	830	270	2600	11000	6000
Phenanthrene	180	3500	1600	8000	92000	47000
Pyrene	400	8000	3100	26000	190000	110000

Notes:

Bold Analyte detected at provided concentration

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TRANSMITTAL FORM

To: **Sean Sheldrake**
U.S. EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101

Date: **November 14, 2006**
Project Number: **415-2328-007 (003A/RQ00)**
Project Name: **GASCO Removal Action Construction Oversight Report**

These are:
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We are transmitting the following materials:

Final Early Removal Action, Construction Oversight Report. Northwest Natural (GASCO) Facility site. November 2006. (2 hardcopies and 3 CDs)

Comments:

Please find enclosed, two hard copies and three CDs of the above-referenced report for your files. If you need anything else, please feel free to call me at (503) 963-7000.

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Environmental Cleanup Office

Sincerely,

Rick Wadsworth, P.E.

cc:

(Rev. 09/05)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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1200 SIXTH AVENUE
SEATTLE, WA 98101

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Appendix C Disc.
Final Early Removal Action

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SEATTLE, WA 98101

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